
**“Delayed Cord Clamping (DCC) Vs intact
Umbilical Cord Milking (UCM) and its effects
on maternal blood loss – a Randomized
Controlled Trial”**

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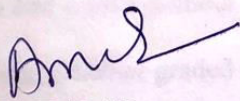
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Dr. ANITA DALAL, MD

Professor & HOD

Department of Obstetrics,

And Gynecology

J.N. Medical College,

Belagavi- 590010

Date:

Place: Belagavi




Dr. (Mrs.) N.S. MAHANTASHETTI, MD

Principal

J.N. Medical College

Nehru Nagar, Belagavi- 590010



Date:

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0831 - 2471350

Nehru Nagar, Belagavi- 590 010, Karnataka, INDIA



0831 - 2470759



www.jnmc.edu

principal@jnmc.edu

Ref No: MDC/PG/

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Reg. No. BJ0120007,
Postgraduate Student,
2020-21 Batch,
Department of Obst. & Gynecology,
J. N. Medical College, Belagavi.

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(Deemed - to - be - University)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELAGAVI-590010 (KARNATAKA-INDIA)

Website: <http://www.jnmc.edu>
E-Mail : dome@jnmc.edu

Phone: (+ 91-(0)831 Office : 2472550
Principal: 2471701
Fax No. +91 (0)831 - 2470759

Date: 25/01/2021

Ref: MDC/DOME/46

To,

REGN NO BJ0120007

PG student in Obstetrics and Gynecology,
J.N.Medical College,
BELAGAVI.

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(Dr. Smita Sonoli)
Member Secretary

JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr. Harsha Hegde)
Chairman,

JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

LIST OF ABBREVIATIONS USED

DCC – Delayed Cord clamping

ECC – Early Cord Clamping

ICC – Immediate Cord Clamping

UCM- Umbilical Cord Milking

PPH- Post Partum Haemorrhage

TSL- Third stage of Labour

AMTSL- Active Management of Third Stage of labour

WHO- World Health Organisation

NFHS- National Family Health Survey

IVH- Intraventricular haemorrhage

NEC- Necrotising Enterocolitis

HB- Hemoglobin

HCT- Haematocrit

PCV- Packed Cell Volume

CCT- Controlled Cord Traction

UM- Uterine Massage

PCD- Placental Cord Drainage

ACOG- American College of Obstetricians

AAP- American Academy of Paediatrics

SOGC – Society of Obstetricians and Gynaecologists of Canada

RCOG – Royal College of Obstetricians

ILCOR -International Liaison Committee on Resuscitation

Tf – Transferrin

RCT- Randomised Controlled trials

CTRI – Clinicals Trials Registry of India

SNOSE – Sequentially Numbered Opaque Sealed Envelope

BMI- Body Mass Index

MSL – Meconium-Stained Liquor

C- Chi square test

MC – Chi square test with Monte Carlo simulation

t – Two sample t test

WT – Welch’s t test

PT – Paired t test

MW – Mann Whitney U test

ABSTRACT

“Delayed cord clamping (DCC) vs intact Umbilical cord milking (UCM) and its effects on maternal blood loss – A Randomised Controlled Trial”

Authors – Dr Kanchibhotla Meghana, Dr M B Bellad, Dr Raj Kumar, Dr Bhawana Koppad

Background and Objectives – Umbilical cord clamping and cutting is one of the unique procedures of birth processes. Placental transfusion after birth helps in additional transfer of blood to the neonate which can prevent iron deficiency anaemia in first year of life. The ideal timing of cord clamping is controversial and debated over decades. Delayed cord clamping has got many advantages with enhanced placental transfusion on neonates but there is limited evidence on maternal postpartum blood loss especially in deliveries with episiotomy, cervical lacerations and delayed hysterotomy closure. The present study is done to estimate the maternal blood loss after umbilical cord milking vs delayed cord clamping.

Materials and methods – It is a randomised controlled trial conducted in KAHER’S Dr Prabhakar Kore Hospital from February 2021 to July 2022 (18 months). Pregnant women admitted in labour room with singleton live gestation of 34 0/7 weeks to 41 6/7 weeks with Hemoglobin > 9.9 mg/dl were screened and eligible women after consenting the study were enrolled. Randomized by SNOSE (Serially Numbered Opaque Sealed Envelopes) method into two groups.

In intact umbilical cord milking group, cord blood was milked for 5 -8 times for a period of 15-20 seconds towards the neonate. In delayed cord clamping group, cord was clamped 60 -180 seconds after the delivery of newborn. Maternal blood loss was estimated by comparing the pre and post-delivery hemoglobin by cyanmethemoglobin method.

Results – During the study period out of 4681 deliveries approached, 1235 participants were screened, and 600 participants were eligible and enrolled for the study. They were randomized into two groups of 300 each and 65 participants were excluded from the study due to various reasons. Intervention was done in 263 participants of DCC group and 272 participants of UCM group. The mean estimated maternal blood loss in delayed cord clamping group was 312.59 ± 133.14 and cord milking group was 311.36 ± 124.88 , which was not significant ($p= 0.913$). However, the drop in post-delivery hemoglobin in delayed cord clamping group (1.76 ± 0.1) was higher than in milking group (1.73 ± 0.11), which was significant ($p<0.001$). The additional administration of uterotonics (medical management) showed significant association between two groups ($p=0.049$) and was higher in delayed cord clamping group. The duration of third stage of labour was not significant between two groups ($p=0.07537$). The incidence of postpartum haemorrhage and need for blood transfusion was not significant between two groups. Likewise the serum ferritin at 3rd month of life was insignificant between two groups($p=0.72$)

Conclusion – From the present study, it is observed that delayed cord clamping was associated with increased maternal blood loss compared to umbilical cord milking which is evidenced by a significant drop in haemoglobin from pre to post delivery. Serum ferritin levels in infants at 3rd month of life did not differ between the two groups. This study provides clear evidence that umbilical cord milking is *equally effective and time saving* with advantages of delayed cord clamping with reduced maternal blood loss. Umbilical cord milking provides dual advantages: Maternal reduced blood loss and serum ferritin levels in infant at third month comparable to delayed cord clamping.

Key words – cord clamping, milking, postpartum haemorrhage.

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INTRODUCTION

Postpartum hemorrhage (PPH) is defined as blood loss of more than 500 ml, with severe PPH being a loss of 1000 ml or more and very severe hemorrhage as a loss 2500 ml or more as classified by World Health Organization (WHO). Uterine atony, is the most common cause of postpartum haemorrhage, resulting from the failure of the uterus to contract effectively following placental delivery¹. Obstetric haemorrhage accounts for 27.1% of all maternal deaths worldwide². Post-partum haemorrhage (PPH) accounts for 72% of all obstetric haemorrhages and is the leading cause of death across the globe³. In underdeveloped countries, PPH contributes to a major cause of death in women who are predisposed to anaemia and malnourishment, whereas in developed countries, though major bleeding complications are less common, yet active management of third stage was been implemented as routine practice in various countries⁴.

Third stage of labour begins with the delivery of the fetus to the complete expulsion of the placenta and membranes. After birth, the cord is clamped and cut and then the placenta is expelled^{5,6}. During the third stage, placenta expels by alternate contraction and retraction of the uterus resulting in blood loss from the sinuses, however opinions vary on to how much of blood loss is considered to be significant^{5,6,7,8}.

The timing of the umbilical cord clamping is still controversial and debated over decades. Before the mid-1950s, early clamping of the cord was practised within the first minute of life, and late clamping was performed after five minutes of delivery⁹. For first few minutes after birth, blood from the placenta continues to flow to the new-born. The process known as "placental transfusion" during which the

umbilical cord is not clamped for two to three minutes or until the cord pulsations cease and this allows for the physiological transfer of placental blood to the newborn¹⁰. The placenta transfers about 80 ml of blood to the new-born in first minute reaching up to about 100 mL over the next three minutes. This gives extra 40–50 mg/kg of iron, which the breast milk usually lacks. It also provides sufficient iron reserve for the first few months of life and help prevent iron deficiency anaemia in first year of life¹¹.

Previously, in Active Management of Third Stage of Labour (AMTSL), early clamping of the cord was frequently practiced within 30 seconds to reduce postpartum haemorrhage but current guidelines refocused on delaying cord clamping for 1-3 minutes to prevent new-born anaemia⁶. The extra blood provided during placental transfusion has various advantages to both term and preterm infants.

Anaemia, a global health problem across the globe especially in developing countries is commonly observed in young children and pregnant women¹². Indian Council of Medical Research surveys showed that over 70% of pregnant women in the country were anaemic.¹³ Maternal anaemia in pregnancy is a risk factor for poor neonatal outcomes and results in cognitive brain effects during infancy and childhood.^{12,13}

The iron deposited during pregnancy has impact on iron deficiency anaemia in infants. Due to their high iron requirements during periods of rapid growth, children are particularly vulnerable to iron deficiency anaemia during the first few years of life¹⁴.

According to National Family Health Survey (NFHS 5) of 2019-2021 system data, the prevalence of anaemia in pregnant women aged 15-49 years (<11.0 g/dl) was

45.7 % in urban areas, 54.3% in rural areas and a total of 52.2%. Whereas the prevalence of anaemia in children aged 6-59 months (<11.0 g/dl) was 64.2% in urban areas, 68.3% in rural areas and 67.1% in total. Anaemia has affected about 529 million women of reproductive age, including almost 38% of pregnant women¹⁵.

Children who develop anaemia due to iron deficiency are more likely to have delayed psychomotor development and have poor performance in tests of language, coordination, and motor skills. Impairments due to iron deficiency anaemia in the early years of life may be lasting, even after the replenishment of iron stores, which highlights the importance of placental transfusions to prevent anaemia in first few years of life¹⁶.

The benefits of delayed cord clamping include reduced infant anaemia rates as a result of higher haemoglobin and iron reserves, more significant cardiopulmonary adaption, higher blood pressure, better neurodevelopment in new-borns and children, need for fewer blood transfusions, decreased rates of intraventricular haemorrhage (IVH), chronic lung disease, necrotizing enterocolitis^{17,18}. Whereas, polycythaemia, jaundice with a greater need for phototherapy, maternal post-partum haemorrhage, or the need for maternal blood transfusions were potential drawbacks of delayed cord clamping.¹⁹

In the past, early cord clamping was practiced to reduce post-partum hemorrhage and the need for blood transfusions in mother²⁰. The benefits of delayed cord clamping for term neonates were well established, but data on maternal outcomes, particularly after caesarean delivery, are largely sparse²¹. Despite the theoretically increased risk of maternal blood loss secondary to delayed hysterectomy closure, studies have shown there were no differences in the mother's pre and post-

delivery hemoglobin values between early and delayed cord clamping of the groups, indicating that the practice of delayed cord clamping represents only a minimal intervention during Caesarean deliveries²².

The present study aims to assess and compare whether delayed cord clamping vs intact umbilical cord milking performed in new-borns after vaginal or caesarean delivery results in excessive maternal blood loss or have any impact on the duration of third stage of labour and related complications like PPH, need for maternal blood transfusions etc.

AIMS AND OBJECTIVES

Primary objective:

1. To estimate the maternal blood loss by comparing the pre and post-delivery hemoglobin and haematocrit values after delayed cord clamping vs intact umbilical cord milking after vaginal and caesarean deliveries.
2. To compare the duration of third stage of labour after these interventions in both caesarean and vaginal deliveries.

Secondary objective:

- To assess the effect of serum ferritin levels on selected number of infants at 3rd month of life.

REVIEW OF LITERATURE

The third stage of labor

Definition:

The third stage of labour is defined as the time interval between birth of the baby to the complete expulsion of the placenta and membranes [23]. During third stage of labour, the umbilical cord is clamped and cut and then the placenta is delivered by the Brandt-Andrews man.²⁴

The normal duration of third stage of labour is usually between 5 to 15 minutes. Several studies have shown the average duration of the third stage of labour is between 6–7 minutes and found that the risk of PPH rises after a TSL of 18 min and the risk of PPH was 6 times higher when the TSL was more than 30 min.^{25,26}

However, third stage of labour can exceed 30 minutes in approximately 3% of women, which is considered as prolonged period. Several factors contribute to the lengthening of the third stage like the use of labour augmentation drugs, use of analgesia during labour, and during placental cord drainage technique.²⁷

Placental cord drainage is a procedure done to accelerate the expulsion of the placenta. In this method, the blood from the placenta and umbilical cord is drained by opening the clamp near to the mother's side. This results in reduction in the volume of the placenta enabling the uterus to contract early and restore to its original state.²⁸

Placental Separation:

After birth, the uterus contracts and retracts resulting in separation of placenta. This occurs by three phases.²⁹

- Strong uterine contractions during the first stage, known as the latent phase, causes the uterine muscle to thicken and creates a shearing force between the placenta and the uterus.²⁹
- The placenta gradually separates as a result of ongoing contractions and is expelled during the expulsion phase.²⁹

Post-partum hemorrhage (PPH)

Definition:

Post-partum haemorrhage (PPH) is defined as "the blood loss of 500 mL or more from the genital tract within 24 hours of the birth of the baby"^{30,31,32}. The World Health Organisation defined PPH as "blood loss of 500 mL or more within 24 hours after birth, while severe PPH is blood loss of 1000 mL or more within 24 hours"³³.

In 2017, approximately 295,000 maternal morbidities have been reported worldwide, giving a total of 211 deaths per 100,000 live births. Obstetric haemorrhage which is the most common cause of maternal mortality, accounts for 27.1% of all maternal deaths worldwide². Post-partum hemorrhage (PPH) accounts for 72% of all obstetric haemorrhages and is the leading cause of death across the globe³.

The placenta is removed either manually or spontaneously during third stage of labor. The risk of post-partum hemorrhage rises if it is not separated for more than 30 minutes [34]. In order to reduce the risk of post-partum hemorrhage, active management of third stage of labor is implemented. Severe post-partum hemorrhage may result in multiorgan failure, anemia, can lead to depression, can result in peripartum hysterectomy, and thromboembolic complications³⁵.

Earlier during third stage of labor, immediate umbilical cord clamping has been used in conjunction with other active management techniques to reduce the risk of post-partum hemorrhage. Recently, there was concern whether delayed umbilical cord clamping could raise the chance of post partum hemorrhage³⁶. However, a study involving five trials with more than 2,200 women showed that delay in umbilical cord clamping did not result in post-partum hemorrhage.³⁷

A comprehensive review study which included 15 randomized controlled trials reveals that the association between early and delayed cord clamping and their impact on post-partum hemorrhage did not show any statistical significance.³⁷

The cause of PPH:

Atonic PPH, or uterine atony, is the most common cause of PPH which results from the inability of the uterus to contract effectively following placenta delivery¹. PPH which typically lasts for 24 hours is referred to as immediate PPH, however, in some instances PPH can occur up to six weeks following delivery referred to as delayed PPH. Uterine atony contributes to almost 75 and 80 percent cases of PPH.³⁸

Other causes can be due to uterine fibroids, multiple pregnancies, oxytocin augmentation, over-distension of the uterus, chorioamnionitis, prolongation of labor, grand multiparity, fetal macrosomia, polyhydramnios, precipitate labour, and exposure to magnesium sulphate regimens and halogenated anaesthetics are other factors which can predispose to uterine atony.³⁹

The effects of blood loss after delivery differs significantly and can be influenced by woman's overall health, the blood loss rate, hemoglobin (Hb) levels at the time of delivery, and the coagulation system.⁴⁰ However, in low-income countries,

where women may be malnourished and anaemic, PPH can result in significant morbidity or fatality.⁴¹

Management of PPH:

Expectant and active management are two unique strategies for the clinical management of the third stage of labor.

However, a third strategy, known as "mixed management" or the "piecemeal approach," is occasionally employed and combines elements of both expectant and active management [42].

Expectant management of the third stage of labour:

- It is a "hands-off" strategy, in which placenta is delivered naturally, with the help of gravity, with maternal efforts or, occasionally, with nipple stimulation.⁴³
- No prophylactic uterotonic medication is administered.^{44,45,46,47}
- The surge of oxytocin during birth triggers the spontaneous contractions of the uterus. Therefore, anything that interferes with the oxytocin release may lessen the effectiveness of the physiological process in the third stage.⁴³
- Therefore, expectant management is considered to be suitable in conditions with no interference with the natural release of oxytocin, such as when oxytocin augmentation, induction, epidural, or narcotic analgesia, or both, have not been employed.^{48,49}

Active management of the third stage of labour:

The active management of the third stage of labour (AMTSL) comprises of three components.

- Provision of uterotonics and clamping of the cord within first one minute of delivery,
- active removal of placenta by controlled cord traction (CCT) following signs of placenta separation, and
- Uterine massage (UM) immediately following placenta removal and every 15 minutes during the first two hours after delivery⁵⁰.

Delaying cord clamping for 1 to 3 minutes after birth is employed to allow for continued blood flow to enhance the infant's iron status.

The WHO 2012 stresses the importance of oxytocin as ideal uterotonic³³. Nevertheless, CCT and prolonged uterine massage are no longer advised in active management.

AMTSL is currently the primary PPH prevention strategy advised by WHO.³³

However, recently trends towards delay in cord clamping points out that it should be an evidence-based component of the active management program.⁵¹ According to Cochrane based Review there was no significant difference in PPH rate after early cord clamping and delayed cord clamping.³⁷

Blood loss measurement

After delivery, there is always some blood loss; however, when there is excessive maternal blood loss, PPH is to be considered.

Early detection of excessive blood loss allows for quicker implementation which benefits the mother's health. Therefore, finding the optimal method to assess post-partum blood loss is crucial⁵².

The birth attendant frequently measures blood loss by observing the volume of blood lost and calculating it (visual estimation) quantitatively or semi-quantitatively. Even though this method is not extremely precise, it is accessible in all birth environments.⁵³

Another technique involves the delivery attendant placing a shallow bedpan beneath the mother's buttocks and weighing the blood that has been gathered and blood that has flowed into any pads or other materials. It is known as an indirect method⁵⁴.

One direct approach that has been developed involves placing a "calibrated delivery drape" (Excellent BRASSSV Drape™) under the mother's buttocks, tying it around her waist, and hanging the calibrated funnel portion of the drape between her legs to show how much blood is lost⁵⁵. Two evaluation methods are available once the bleeding stops: either the bag can be calibrated so that a direct measurement can be made, or it can be weighed (a process known as the gravimetric technique)⁵⁶. Hemoglobin concentration (Hb) in venous blood sampling and spectrophotometry provides a more accurate way to assess blood loss.



Fig 1 – BRASSSV Drape TM

Placental cord drainage

Placental cord drainage is when the placental blood is drained into the vessel immediately after clamping and cutting the umbilical cord⁵⁷. First, the infant's cord is clamped and cut, followed by immediate unclamping of the cord near the mother's side. Then, blood from the placenta is completely drained into the container. As a result, the volume and bulkiness of the placenta reduce, which enhances uterine contraction and helps expel the placenta. In addition, enabling the placental cord drainage might promote early delivery of the placenta, thus reducing the length of the third stage of labour⁵⁸.

Placental transfusion

The additional placental blood volume transferred to the baby at birth is known as placental transfusion. Uterine contractions, the position of the new-born after delivery, and the timing of umbilical cord clamping are the three key variables that determine placental transfusion⁵⁹.

Immediately clamping the cord, may deprive the infant of 20–30 mg/kg of iron, which is sufficient for an infant's during first three months of life⁶⁰.

During the placental transfusion, the newborn receives an additional 15–40 ml/kg of blood from the placenta through the umbilical cord. Delay in cord clamping can increase a term neonate's blood volume by roughly 30–50%⁶¹. Roughly 25% of the transfer occurs in the first 15 to 30 seconds after delivery, followed by 50% to 78% in a minute, and the remaining 25% in three minutes⁶².

In preterm new-borns, a brief delay in cord clamping (30 to 45 seconds) increased blood volume by 8% to 24% (2 to 16 ml/kg for caesarean deliveries and 10 to 28 ml/kg for vaginal deliveries)⁶³. Frequently, a residual volume of 15 to 20 ml of collected placental blood might be obtained through the umbilical vein. When the cord is immediately clamped, there is loss of 20ml/kg of whole blood and 25mg/kg of iron⁶⁴.

Therefore, the timing of the umbilical cord clamping will determine the degree of placental transfusion.

The historical aspect of cord clamping

For at least 200 years, there had been complex controversies regarding the timing of umbilical cord clamping. The technique of early cord clamping within the first 15 seconds has received much attention during the past few decades. However, recent randomized controlled trials from the twenty-first century discovered the advantages of delaying cord clamping by 2-3 minutes. Since then, comprehensive evaluations and improved scientific society evidence regarding delayed cord clamping have offered guidelines for obstetrics practice for term infants¹⁰.

Erasmus Darwin, a distinguished physician, published in 1801 that premature tying and cutting of the cord should be delayed until the cord pulsations cease. During the second part of the 20th century, instantaneous cord clamping was used in western nations. In the 1960s and 1970s, several modest studies were carried out to support quick cord clamping. However, there was no substantial evidence to back up this.¹⁰

As survival rates have grown over the years, the focus of the umbilical cord clamping debate has switched to preterm infants. Immediately clamping the umbilical cord within 10 to 15 seconds provides lesser benefits. However, over the past 20

years, numerous studies have demonstrated the substantial benefits of delayed cord clamping. During the twenty-first century, growing evidence of newborn infant cord clamping led to the widespread adoption of the procedure.⁶⁵

A comprehensive Cochrane evaluation of 7 trials involving preterm newborns lead to the development of delayed cord clamping. The timing of placental transfusion concerning the time of cord clamping was examined in the study. When cord was clamped for 30 to 120 seconds, the rates of anemia and intraventricular hemorrhage were reduced in infants⁶⁶.

Placental transfusion technique

Initially, the umbilical cord was clamped within 60 seconds as a part of active management. However, according to 2012 World Health Organization guidance, delayed cord clamping was advised to be performed within one to three minutes after the birth except for the babies requiring active resuscitation or if asphyxiated.³⁷

Early cord clamping

In the past, the umbilical cord was clamped immediately within 30 seconds after birth regardless of the end of the cord pulsation. Downgrade traction of the cord was used to help deliver the placenta after it had separated. In addition, controlled cord traction, believed to lessen blood loss, was used to shorten the third stage of labour to prevent excessive maternal blood loss. On the other hand, the current recommendations for managing the third stage of labour promote delayed clamping.⁶⁷

Delayed cord clamping

Delayed cord clamping is the procedure in which clamping of the cord is delayed for at least 60-180 seconds after birth of the new-born or until the cord

pulsations cease. The delay in cord clamping positively affects premature or non-vigorous infants⁶⁸.

Benefits and adverse effects of early and delayed umbilical cord clamping

Delaying cord clamping promotes for extra 30% of blood volume and 60% of red blood cells¹⁸. Additionally, improved iron levels throughout the first six to one year of life. The benefits include reduced infant anemia rates as a result of higher hemoglobin and iron reserves, more significant cardiopulmonary adaption, higher blood pressure, better neurodevelopment in newborns and children, less anemia, fewer transfusions, decreased rates of intraventricular hemorrhage (IVH), chronic lung disease, necrotizing enterocolitis, and late-onset sepsis^{17,18}. Polycythaemia, jaundice, a greater need for phototherapy, maternal post-partum hemorrhage, or the demand for maternal blood transfusions are potential drawbacks of DCC¹⁹.

Early cord clamping may increase the likelihood of feto-maternal circulation, in which a higher blood volume is sent back to the placenta into the maternal circulation. This condition might increase the risk of Rh-D immunoglobulin prophylaxis.⁶⁹

Infants born preterm are more vulnerable to complications from early cord clamping. Therefore, the main objective of active management is to shorten the third stage of labor to lessen the likelihood of significant maternal bleeding.⁶⁷

Umbilical cord milking

Another acceptable method of placental transfer is umbilical cord milking. Before clamping, placental transfusion is accomplished by gently squeezing or milking the

cord blood in less than 10-15 seconds toward the new-born. It is a technique for active transfer.⁷⁰

The procedure is carried out immediately with a similar time required as early cord clamping, allowing the neonatologists to administer further resuscitation if necessary. There was no discernible statistical difference in mortality or intraventricular haemorrhage between delayed cord clamping and umbilical cord milking.⁷¹ However, the finding in a study conducted by Katheria et al. showed that umbilical cord milking group significantly had higher rates of intraventricular haemorrhage.⁷¹

Except in cases of distressed or asphyxiated new-borns, the American College of Obstetricians and Gynaecologists (ACOG) and the American Academy of Paediatrics (AAP) recommended delaying umbilical cord clamping by at least 60 seconds in both term and preterm neonates. Because UCM can quickly enhance blood transfusions from the placenta to the newborn, it can be considered in terms of neonatal or maternal emergency intervention requirements⁷⁰.

Timing of umbilical cord clamping

The umbilical cord is usually clamped 10-15 seconds after birth, depending on whether the baby is at or below the placenta's level. The position and timing of the cord clamping on the newborn also impact the placental transfusion⁷². Few studies have shown that healthy-term newborns achieve more than 90% of their blood volume within the first few breaths after birth.⁷³

An essential concern in delayed cord clamping is that it benefits infants and prevents iron deficiency anemia. [74]. Early cord clamping, on the other hand, has not been proven to have as advantages or benefits of DCC⁷⁵.

According to Hutton's research, increased placental transfusion owing to cord clamping delay of up to 40 seconds is advantageous to newborns suffering from fetal distress syndrome⁷⁶. According to the WHO, delayed cord clamping increases a baby's iron reserves, particularly in environments with little resources and in low- and middle-income nations where iron deficiency anemia is common. Evidence also shows that after birth and for 4 to 6 months, delaying cord clamping improves hemoglobin levels by 2-3 g/dL, hematocrit, and circulating ferritin⁷⁵.

Fig 2 – Recommendations by various organisations on timing of cord clamping in term and preterm infants.

Organization	Preterm <37 wk	Term ≥37 wk
WHO 2012, 2014	Delay of umbilical cord clamping for 1-3 min is recommended for all births with simultaneous essential newborn care ¹²	
ILCOR 2015	Delay umbilical cord clamping for at least 1 min in both term and preterm infants who do not require resuscitation at birth. Evidence does not support or refute delayed cord clamping when resuscitation is needed ^{13,14}	
RCOG 2016	Routine early clamping of the umbilical cord no longer recommended. Umbilical cord should not be clamped earlier than 1 min if there are no concerns over cord integrity or the baby's well-being ¹⁵	In healthy term babies, practice “deferred” cord clamping (delay clamping for at least 2 min) ¹⁶
SOGC 2016	Delayed cord clamping by at least 60 seconds is recommended irrespective of mode of delivery ¹⁷	The risk of jaundice is weighed against the physiological benefits of delayed cord clamping
AAP 2017	Endorse recommendations of ACOG 2017 ¹⁸	
ACOG 2017	At least 30-60 second delay in cord clamping in vigorous term and preterm infants ¹⁹	

AAP, American Academy of Pediatrics; ACOG, American College of Obstetricians and Gynecologists; ILCOR, International Liaison Committee on Resuscitation; RCOG, Royal College of Obstetricians and Gynaecologists; SOGC, Society of Obstetricians and Gynaecologists of Canada; WHO, World Health Organization

Literature review

Umbilical cord milking enhances short-term haematological results, according to a comprehensive review and meta-analysis of nine trials comparing delayed cord clamping with umbilical cord milking in term and late preterm new-borns⁷⁷.

At 48–72 hours after birth, intact umbilical cord milking raised hemoglobin levels compared to delayed cord clamping. Furthermore, at 6–8 weeks of age, when compared to delayed cord clamping, hemoglobin levels in intact cord milking were considerably more significant. However, the study noted that the evidence for the analysed outcomes were inadequate⁷⁷.

Between 2009 and 2017, a long-term multicentre, randomized controlled trial including very preterm infants (less than 30 weeks) was carried out at 25 locations in seven countries. The study compared delayed cord clamping to immediate clamping to determine the mortality rate and significant disability at two years. Visual impairment, hearing loss needing cochlear implants or hearing aids, cerebral palsy, and language or speech difficulties among the severe disabilities examined¹⁵.

At 0.83 relative risks, the primary outcome of death or significant disability was noted in 29% of cases for delayed cord clamping and 34% of cases for immediate cord clamping. In addition, 8% and 11% of the infants in each group passed away before age two years of age. In new-borns with delayed and immediate cord clamping of the umbilical cord, the principal impairment in 2 years occurred in 23% and 26% of the infants. Delaying cord clamping has shown to lower the risk of death while not affecting severe disability¹⁵.

In a meta-analysis of three randomized controlled studies, the effects of delayed cord clamping and umbilical cord milking on term new-borns were compared, and umbilical cord milking raises hemoglobin levels six weeks after birth. However, no statistically significant changes were found between the hemoglobin levels at birth and the serum bilirubin or haematocrit levels^{78,79} .

A thorough study and meta-analysis examined the effects of umbilical cord milking in new-borns born at or below 37 weeks of gestation. According to the study, umbilical cord milking enhances preterm mean blood pressure, initial hemoglobin levels, and haematocrit while lowering their need for transfusion risk⁸⁰ .

In a related study, umbilical cord milking in term and late-preterm new-borns was compared to delayed umbilical cord clamping in terms of mother and neonatal outcomes. Umbilical cord milking has advantages over instantaneous cord clamping regarding haematological parameters . However, the umbilical cord milking practice was not highly recommended due to inadequate data and the small number of patients in the trial⁸¹ .

Both immediate and delayed cord clamping showed no significant difference when comparing maternal blood loss by looking at pre and post-operative haematological parameters after caesarean delivery. However, concerning neonatal benefits, delay in cord clamping resulted in considerably higher hemoglobin (18.1g/dL) than immediate cord clamping⁸² .

The effects of the timing of cord clamping in preterm new-borns were documented in a Cochrane review encompassing 48 papers of randomized controlled trials. Infants born preterm had a lower risk of dying when the cord was clamped later. Due to insufficient data, deciding the optimal time to clamp is still debated. However, the

current body of research ensures that in preterm births, the cord should not be clamped before 30 seconds⁸³.

The rates of intraventricular haemorrhage in preterm infants were compared in umbilical cord milking and delayed cord clamping groups. It was found that, these interventions did not have impact on the rates of death. However, the IVH rate seemed to be higher in cord-milking group⁷¹.

Similar studies compared early versus delayed cord clamping and showed that delay in cord clamping was safe in term and preterm infants and had beneficial effect by a 2.73% increase in haematocrit, reduced hospital mortality, and improved infants and children's neurodevelopment status^{19,69}.

Hemoglobin levels during in-utero and first year of life

About 529 million women of reproductive age, including almost 38% of pregnant women, are affected by the severe global health issue of anaemia. In both high- and low-income nations, anaemia is the main contributor to maternal death and unfavourable pregnancy outcomes¹⁵.

By 2025, the World Health Organization (WHO) aims to reduce the rates of anaemia in women of reproductive age by 50%. WHO guidelines for antenatal care and the U.S. Centres for Disease Control and Prevention, has got specific cut-offs for anaemia in each trimester as 11 g/dL in the first trimester, 10.5 g/dL in the second trimester, and 11 g/dL in the third trimester⁸⁴.

Several long-term studies indicate maternal anaemia is linked to infant anaemia, including a randomized controlled trial on iron supplementation during pregnancy. However, the impact of maternal iron insufficiency during pregnancy on new-born iron reserves is debatable⁸⁵.

Transferrin (Tf) transports iron (Fe) into the maternal circulation. A holo-transferrin complex is created when the syncytiotrophoblast on the placental epithelium attaches to the transferrin. Iron is released into an acidified endosome during endocytosis of the complex, where it is then transferred to the cytosol by a divalent metal transporter.

Ferroportin transports the iron from the syncytiotrophoblast's basolateral membrane into fetal circulation. Fetal transferrin receives the iron after it has been oxidized by the ferroxidase enzyme⁸⁶. During the last trimester of pregnancy, the fetus receives most of the iron⁸⁷.

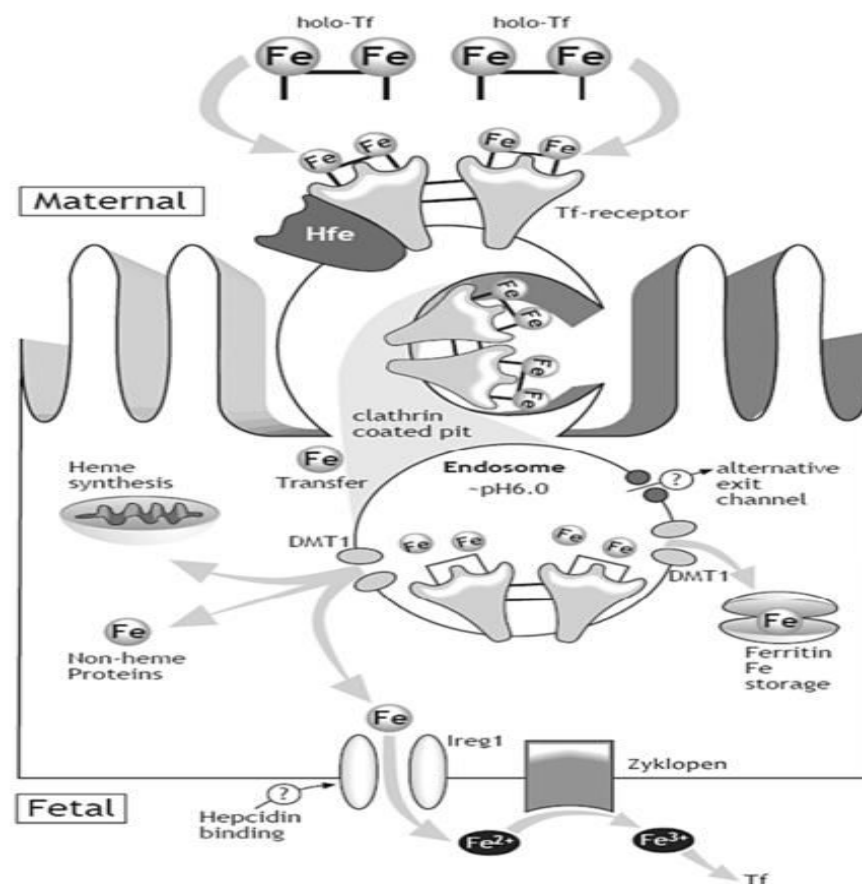


Fig 3 – Iron metabolism transport in new born

Haemoglobin levels, as a result, are more significant at birth and drop from around 17 gm/dl to about 11.2 gm/dl in the first two months of life. The "physiological anaemia of infancy" describes this interim stage. It is caused by the shorter fetal erythrocyte lifespan, a decrease in the formation of red blood cells, and a dilution effect from increased blood volume concerning growth⁸⁸.

Haemoglobin concentration gradually rises from the second month of neonatal life and typically reaches 11.8 gm/dl by four to six months of age. The total body iron is redistributed during the first few months of new-born life. The new-born's body has about 260 milligrams of iron in total and 70% is hemoglobin, 24% is ferritin and myoglobin storage, and the remaining 6% comes from iron-containing enzymes⁸⁹.

After 4 to 6 months, the breastfed new-born consumes exogenous iron sources and total body iron increases to roughly 420 mg. Neonatal birth weight, gestational age, and maternal iron status are the main determinants of iron storage in a neonate¹²

It is commonly established that birth weight impacts a baby's iron reserves. Birth iron stores rise because of a linear association between body iron and birth weight⁹⁰. Although gestational age is connected to the quantity of body iron deposited at delivery, the relationship between birth weight and gestational age may account for a considerable part of this. The overall quantity of iron deposited in the liver increases due to an increase in liver size during the last eight weeks of pregnancy, which is related to neonate birth size⁹¹.

Depletion of iron stores during the first year of life

During first six months, infants are exclusively breastfed. However, the amount of iron in breast milk is not very high. The quantity of iron received from

human breast milk is roughly similar to the total amount of iron lost, which was lost through the sloughing of intestinal epithelial cells⁹².

Additionally, given that anaemia is so common in children between the ages of six and nine months, there is concern that iron stores at birth may not be enough to support their growth and development for the first six months of life⁹³.

Consequences of fetal/infant anemia

Iron is an essential element for brain development⁹⁴. Red blood cells in the fetus receive more iron than other tissues, including the brain⁹⁵. Poor cognitive, motor and social outcomes later in life are related to iron insufficiency in infancy. Additionally, even after the iron deficiency is corrected, an early-life iron insufficiency causes irreversible brain damage.⁹⁶

Early administration of iron treatment before iron deficiency symptoms is the best way to prevent and correct adverse effects. This demonstrates how crucial it is to prevent iron deficiency in foetuses and young children.⁹⁷

How to Prevent iron deficiency anaemia in infancy:

Iron supplementation during pregnancy, delaying the umbilical cord clamping at birth, early initiation of breastfeeding, and continuing exclusive breastfeeding for six months are interventions that have been proven to successfully prevent iron deficiency during the first six months of life.⁹⁸

Effects of delayed cord clamping in the term, preterm infants and mothers

Immediate benefits			Long-term benefits	
Preterm/low-birth-weight infants	Full-term infants	Mothers	Preterm/low-birth-weight infants	Full-term infants
Decreases risk of: • intraventricular haemorrhage • necrotizing enterocolitis • late-onset sepsis	Provides adequate blood volume and birth iron stores	No effect on maternal bleeding or length of the third stage of labour	Increases haemoglobin at 10 weeks of age	Improves haematological status (haemoglobin and haematocrit) at 2–4 months of age
Decreases need for: • blood transfusions for anaemia or low blood pressure • surfactant • mechanical ventilation	Increases: • haematocrit • haemoglobin	Indication from “cord drainage” trials that less blood-filled placenta shortens the third stage of labour and decreases the incidence of retained placenta	May be a benefit to neurodevelopmental outcomes in male infants	Improves iron status up to 6 months of age
Increases: • haematocrit • haemoglobin • blood pressure • cerebral oxygenation • red blood cell flow				

Effects of delayed cord clamping in term infants

Many systematic reviews have studied the advantages and disadvantages of delayed cord clamping and showed an improvement in iron status and an increase in haemoglobin concentration up to six months after birth thus lowering the risk of early new-born anaemia and iron insufficiency.⁹⁹

Increased new-born blood volume increases iron storage and haemoglobin concentrations and worsens jaundice. In a recent Cochrane based analysis, the delayed cord clamping group showed considerably increased rates of developing jaundice that required phototherapy compared to the early cord clamping group^{37,76}. There were no differences between early cord clamping and delayed cord clamping in terms of

Apgar scores at five minutes, rates of NICU admission, or rates of respiratory distress in healthy-term new-borns.¹⁰⁰

DCC results in more significant mean blood pressure which enhances the hemodynamics and organ perfusion in infants.¹⁰¹

Higher hemoglobin at 4 to 12 months of age, improved serum ferritin during the first year, improved total body iron stores at one year of age were noted in infants after delayed cord clamping⁷⁶. Therefore, a universal approach to delayed cord clamping in the term infant can be justified based on the currently available evidence.

Effects of delayed cord clamping on preterm infants

Preterm new-borns are more prone to resuscitation problems than term infants. However, numerous studies demonstrate the benefits of delaying cord clamping in preterm neonates by more than 30 seconds.¹⁰² Studies have shown that delayed cord clamping did not have any effect on Apgar scores of infants, or other adverse neonatal outcomes like respiratory distress, jaundice needing phototherapy, or neonatal mortality.¹⁹

Iron deficiency in infants can have impact on their neurodevelopment.¹⁰³ A brief delay of 30 to 60 seconds in clamping the cord had a positive impact on the neurobehavioral outcomes on late preterm infants (34–36 weeks) who showed higher scores in both motor development vigor (MDV) and alertness orientation at 37 weeks post-conception age.¹⁰⁴

Delayed cord clamping has shown the benefits of improved systemic blood pressure, decreased need for inotropic support, increased blood flow in the superior vena cava, increased left ventricular output, higher cerebral oxygenation index, lower frequency

of any intracranial haemorrhage, and decreased need for and the number of blood transfusions for anaemia, reduced risk of late-onset sepsis and no difference in the rates of severe intraventricular haemorrhage.^{66,105}

NRP guidelines

Delaying cord clamping for longer than 30 seconds in neonates who do not need resuscitation lowers anemia, especially in preterm infants.¹²⁶

Effects of delayed cord clamping on mothers

In the past, early cord clamping was practiced to reduce post-partum hemorrhage and the need for blood transfusions for the mother.²⁰

The benefits of delayed cord clamping for term neonates are well established, but impact on maternal outcomes, particularly after caesarean delivery, were largely sparse. Impact of DCC after caesarean section are underrepresented in the literature because the typical blood loss is at least twice as significant as during vaginal deliveries. In addition, it was hypothesised that there was further increased risk of bleeding because of delay in hysterectomy closure.²¹

A thorough analysis of delayed cord clamping at term pregnancies revealed no differences in maternal blood loss. However, the included trials focussed on low-risk women who delivered vaginally.⁸²

In a pilot study comparing delayed cord clamping, authors found no variations in the mean levels of hemoglobin and the study showed that delay in cord clamping resulted in decreased estimated blood loss and maternal transfusion rates.¹⁰³

Although there was no appreciable increase in adverse maternal outcomes, another study compared the impact of DCC in less than 34 weeks which was institutionalized. Despite the theoretically increased risk of maternal blood loss secondary to delayed hysterotomy closure, there was no difference noted in the mother's pre- versus post-operative hemoglobin values between the groups, which indicated that the practice of DCC was a minimal interruption during Caesarean deliveries²².

Another retrospective study by Ruangkit et al. among women with multiple pregnancies showed that delayed cord clamping group did not result in increased risk of bleeding complications, maternal blood loss, or drop in post-delivery hematocrit values.¹⁰⁶

In summary, DCC appears to be a feasible procedure from an obstetric perspective and did not appear to increase the risk of excessive maternal post-partum hemorrhage.

Effects of umbilical cord milking

For the past several years, evidence from many studies reported delayed cord clamping to be beneficial in both term and preterm infants. However, there remains uncertainty regarding the optimal timing for cord clamping in infants. Therefore, an alternate technique called umbilical cord milking (UCM), in which the cord from the placenta is grasped and squeezed gently toward the infant. Umbilical cord milking is done immediately as early cord clamping and enables quick placental transfusion without any delay in resuscitation.

Evidence on cord milking shows substantially improved hemoglobin, hematocrit, and blood pressure from the first few days of life to 6 months of age.¹⁰⁷ In addition, studies comparing umbilical cord milking and delayed cord clamping in

neurodevelopment skills and cognitive and language scores show improved outcomes in infants of milking group, but the trial included a small sample size in preterm infants.⁷¹

Based on decreased rates of morbidities like death and IVH following cord milking, some centres have implemented this technique as their exclusive standard of care.^{108,109} According to a recent survey of obstetricians and perinatologists in the United States, 38.9% of obstetrical practitioners employ umbilical cord milking.¹¹⁰

Effect of umbilical cord milking in term infants

Immediately clamping (ICC) the umbilical cord was the recommended course of action for new-borns who were non-vigorous (limp, pale, and not breathing) and required resuscitation at birth.¹¹¹ About 20 to 40 percent of the feto-placental blood volume remains in the placenta when immediate clamping of cord occurs.^{112,113} This substantial amount of fetal blood left in the placenta after ICC may worsen the new-born's transition and cardiac output, lowering cerebral blood flow and causing tissue hypoxia which may result in brain ischemia, multi-organ damage, or death.^{112,114} Additionally, immediate clamping may be linked to bradycardia, elevated pulmonary artery pressure with a consequent right to left shunt, decreased cardiac output and increased carotid artery pressure.^{115,116}

The American Congress of Obstetricians & Gynaecologists (ACOG) states that infants who require resuscitation may benefit considerably from placental transfusion, but their need for immediate attention about whether they should undergo immediate or delayed umbilical cord clamping and whether umbilical cord milking (UCM) offers a unique benefits shows lack of studies in non-vigorous new-borns.⁹

Effect of umbilical cord milking on preterm infants

A systematic review and RCTs comparing cord milking to immediate clamping of the cord in preterm infants showed improved blood pressure, hemoglobin, urine output, cerebral oxygenation, lower risks of intraventricular haemorrhage (IVH), lower levels of chronic lung disease (defined as oxygen requirement at 36 weeks), less necrotizing enterocolitis, lower levels of circulating cytokines, and a decreased need for blood transfusions¹¹⁷⁻¹²¹

Higher ferritin levels were noted in late-preterm infants at six weeks of age after cord milking. Cord milking efficiently speeds up placental transfusion at delivery, providing advantages over immediate clamping .¹²²

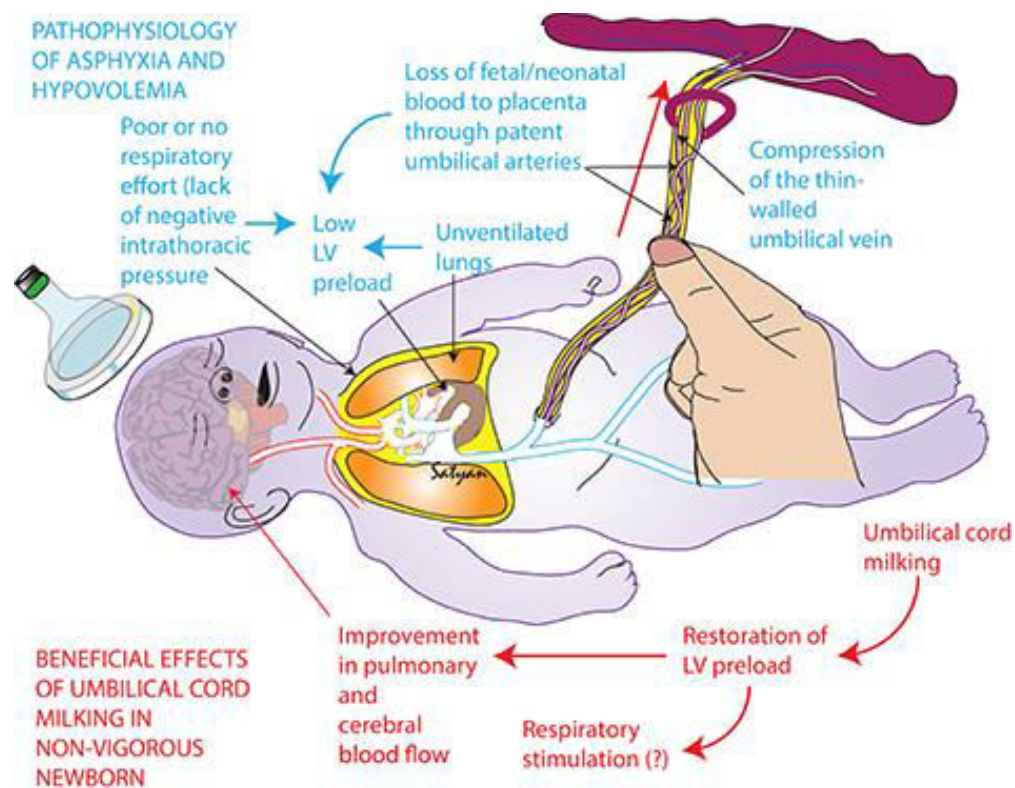


Fig 4 – Benefits of umbilical cord milking in neonates.

Delayed clamping versus milking

Rabe et al., compared delayed cord clamping and umbilical cord milking and concluded that in preterm infants, milking the cord four times achieved a similar amount of placento-fetal blood transfusion compared to delaying clamping the cord for 30 seconds.⁸³

Milking of the umbilical cord may be an alternative strategy for increasing placental transfusion in the preterm babies. Recent studies showed milking the cord and delayed cord clamping had similar effects in hemoglobin concentration, need for transfusions, and other secondary outcomes such as intraventricular haemorrhage, sepsis, necrotizing enterocolitis, and death.⁷¹

Current practices on timing of umbilical cord

A recent study conducted in Europe described the current practices on timing of umbilical cord clamping. This study concluded that 66-90% of maternity units in Belgium, France, Italy, the Netherlands, Portugal, Spain, Switzerland, and the UK had policies of clamping and cutting the cord immediately after birth.¹²³

Conversely, 65-74% of maternity units in Austria, Denmark, Finland, Hungary, and Norway had policies of waiting and clamping the cord after cessation of cord pulsation.¹²³

There was no demographic determinants in the timing of cord clamping. Many respondents implied that practice was dictated by institutional policies independent of their beliefs.¹²⁴ The high degree of variability in the timing of cord clamping found in these studies reflects an inadequate scientific or evidence base.

Attitudes of health professionals toward delayed cord clamping

A questionnaire-based study published in 2009 attempted to investigate obstetricians' attitudes toward delayed cord clamping. They concluded that only 9.3% of obstetricians from hospitals across the British Isles, European countries, the U.S.A., Canada, Australia, etc., were adhere to recommendations on delayed umbilical cord clamping. Reasons for non-adherence included difficulty in implementing delayed cord clamping in clinical practice and being unaware of the scientific evidence.¹²⁵

A questionnaire conducted among 303 certified nurse-midwives from American College of Nurse-Midwives, 21% reported that they had clamped the cord immediately, 5% clamped before one minute, 35.7% clamped between one to three minutes, 3.8% clamped after three minutes, and 29.3% clamped after cord pulsations have ceased.¹²⁴

The present study aims to compare umbilical cord milking vs delayed cord clamping and their effects on maternal blood loss. Both techniques have been proven to be advantageous to the neonate with enhanced placental transfusion but there is limited evidence on the maternal outcomes like post-partum haemorrhage and impact on duration of third stage of labour and so the present study aims to compare the impact of these interventions on maternal outcomes.

MATERIALS AND METHODS

KLE's Dr. Prabhakar Kore Hospital & MRC, Belagavi, to compare the effect of delayed cord clamping vs intact umbilical cord milking and their effects on maternal blood loss and duration of third stage of labour.

Ethical Considerations

After obtaining clearance from Institutional Ethics Committee of Jawahar Lal Nehru Medical College Belagavi.

Study design : A Randomized Controlled Trial.

The trial is registered in CTRI – Ref number - CTRI/2021/08/036094.

Study population : Antenatal patients admitted in labour room for delivery in KLE's Dr. Prabhakar Kore Hospital & MRC, Belagavi.

Selection criteria

Inclusion criteria :

1. Singleton live gestation.
2. Gestational age 34 0/7 weeks to 41 6/7 weeks.
3. Maternal Hb: > 9.9 mg/dl (according to WHO criteria 2011).
4. Babies who do not require active resuscitation at birth.
5. After obtaining informed consent.
6. Cervical dilatation < 6 cm (3 fingers)

Exclusion criteria:

1. Multiple gestation.
2. Diabetes and Hypertension
3. Known case of bleeding disorders.
4. Cord abnormalities. (Cord prolapse and true knots).
5. Rh sensitised pregnancy.
6. Congenital anomalies of foetus
7. Intrauterine fetal death.
8. Severe Intrauterine growth restriction.
9. Fetal distress (baby requiring resuscitation in opinion of obstetricians and paediatrician).
10. Abnormal placentation.
11. HIV and HbsAg positive status.
12. Antepartum eclampsia.
13. Thick meconium stained liquor.
14. Not willing to participate in the study.

SAMPLE SIZE

The formula used for sample size calculation is,

$$n = \frac{2 (Z_{\alpha/2} + Z_{\beta})^2}{d^2}$$

$$\text{where, } d = \left(\frac{|\mu_1 - \mu_2|}{\sigma} \right)$$

Where, μ_1 is mean of the first group(581.5),

μ_2 is mean of the second group(509.3),

σ^2 is the common error variance,

$Z_{\alpha/2}$ value is 1.96 for 95% confidence level and Z_{β} value is 2.33 for 99% power.

Blood loss after delivery is observed to be 581.5 ± 469.2 and 509.3 ± 332.7 in ECC and DCC groups respectively¹⁰⁶.

Considering this at 5% level of significance, and 99% power, the sample size is obtained to be 132 subjects for each group.

Assuming 20% drop out in each group sample required each group is $158.4=159$.

Total sample size required is $159 \times 2 = 318$ subjects.

Considering 10% attrition, sample size obtained is 400.

METHODOLOGY

1. Pregnant women admitted to labour room for delivery who fulfilled the selection criteria were screened and eligible women were consented and enrolled for the study.
2. Participants were randomised by SNOSE method (Sequentially Numbered Opaque Sealed Envelope).

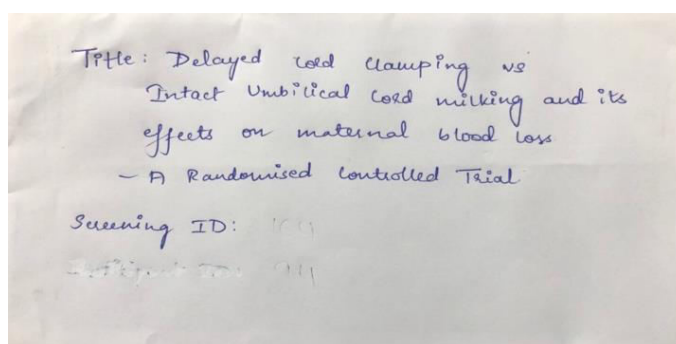


Fig – 5 – Sealed envelope (SNOSE Method)

3. Participants were randomised into two groups.
 - Group A – Delayed Cord Clamping (DCC)
 - Group B – Umbilical Cord Milking (UCM)
4. The details of each participant were recorded using a self-designed, pre-tested, structured Proforma (copy enclosed).
5. Participants were screened for baseline haemoglobin (done by Cyanmethemoglobin method) and haematocrit values.

PROCEDURE

After delivery, the baby was placed at a lower level or at the level of introitus in vaginal deliveries and between mother's thighs in caesarean section.



Fig 6 - At the level of introitus in vaginal deliveries



Fig 7 - In between mother's thighs in cesarean section

Umbilical cord milking

During cord milking, the cord blood was milked for 5-8 times towards the new-born for a period of 15-20 seconds, in an approximately 20-25 cm cord length with a speed of 10 cm/second and giving a 2 second interval to allow blood refilling from placenta towards the cord.



Fig – 8 - Intact Umbilical Cord Milking

Delayed Cord Clamping

- In delayed cord clamping group, the cord was clamped after 60 -180 seconds of the delivery of the new-born or when the cord pulsations had ceased.



Fig 9 - Delayed Cord Clamping

Uterotonic drugs like Injection Oxytocin 10 U intramuscular route were administered as per the Active Management of Third Stage of Labour (AMTSL) criteria (immediately after the delivery of the baby).

Estimation of maternal blood loss

- Blood loss in Vaginal deliveries is measured by calculating the blood collected in the BRASSS V DRAPE (calibrated) after the delivery of placenta.



Fig 10 – Calibrated BRASSS V DRPAE

- In Cesarean sections – blood loss is measured by counting the number of mops soaked with blood and by measuring the blood collected in the separate suction cannister apparatus. Each soaked mop contains– 30 ml



Fig 11 - Mops soaked (left) with suction apparatus for blood collection

Blood samples were collected from the mother to estimate haemoglobin (by Cyanmethemoglobin method) and haematocrit – at the time of admission and 24- 48 hours following delivery

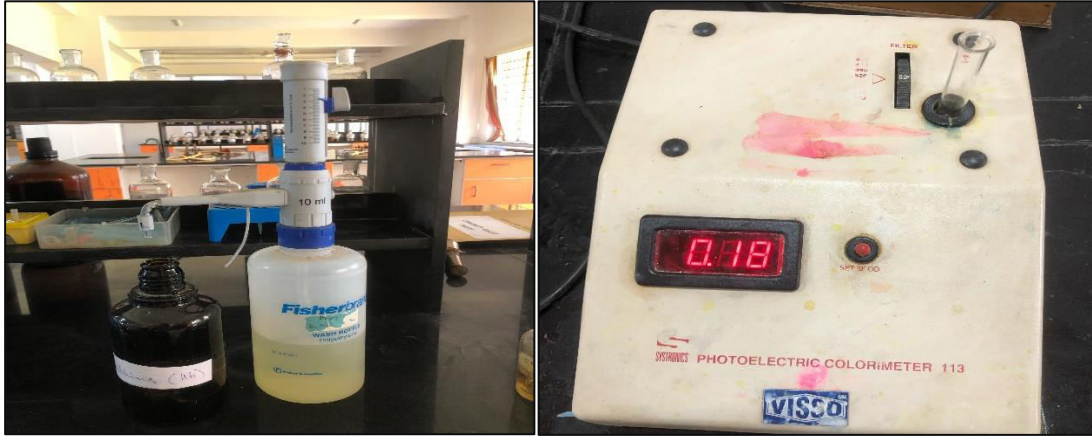


Fig 12 - Cyanmethemoglobin solution (left) with photoelectric colorimeter for blood collection (right) to calculate hemoglobin.

STATISTICAL ANALYSIS

1. Data is analysed using SPSS software version 21 and Excel.
2. Categorical variables are given in the form of frequency table like parity, term or preterm gestation, mode of delivery, postpartum haemorrhage estimation, additional methods like uterotonics, Hayman's suture, B lynch techniques.
3. Continuous variables are given in Mean $\pm$ SD/ Median (Min, Max) form like age, gestational age , BMI, duration of DCC and UCM , number of times cord milked, blood loss, pre op and post op hemoglobin and haematocrit and duration of third stage .
4. Chi-square test is used to check the dependency between categorical variables.
5. Two-sample t test/ Welch's t test is used to compare means of variables over groups.
6. Paired t test is used to compare HB and haematocrit between the time points (at admission and 24-48 hours after delivery)
7. P-value less than or equal to 0.05 indicates statistical significance.

RESULTS

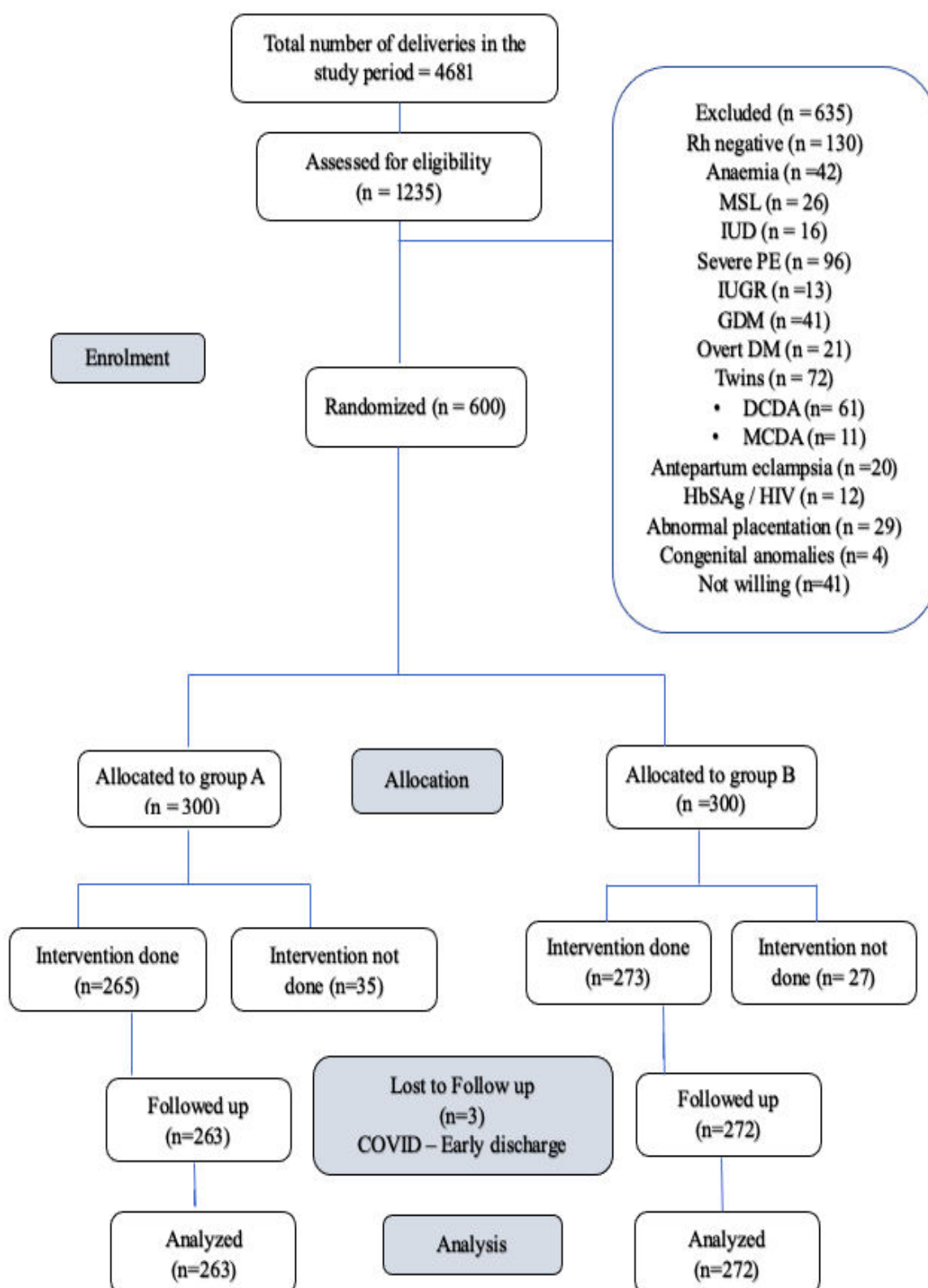
This randomized controlled trial was carried out in the department of Obstetrics and Gynaecology, KLE'S Dr Prabhakar Kore Hospital and Medical Research Centre, Belagavi.

During my study period, there were a total of 4681 deliveries and 1235 women were screened for the study and after fulfilling the selection criteria, 600 participants were eligible and enrolled for the study and they were randomised into two groups of delayed cord clamping and intact umbilical cord milking.

Out of 600 participants, 535 participants underwent the intervention and 65 did not undergo due to various reasons as mentioned below.

1. Analysis of 535 participants with 263 subjects in DCC group and 272 subjects in UCM group was done. A separate sub analysis was done to compare amongst the two groups with respect to mode of delivery i.e. vaginal and caesarean delivery.
2. A separate analysis of 460 subjects with equal number of subjects in both groups of 260 each was made with respect to vaginal and caesarean delivery.

CONSORT diagram (Consolidated Standards of Reporting Trials)



Reasons for exclusion:

Excluded – 62 and lost to follow up - 3

- Baby had weak cry (Perinatal asphyxia) - 5
- Meconium-stained liquor (MSL) – 43
 - Thin MSL – 25
 - Thick MSL - 18
- Persistent fetal tachycardia – 2
- Fetal distress – 12

RESULTS

The data from 535 participants were analysed and tabulated as below:

Table 1 – Age wise distribution between two groups:

Variables	Sub Category	Intervention group		Total N= 535	p-value
		Group A N=263	Group B N=272		
Age (years)	<20	17 (6.5%)	25 (9.2%)	42 (7.9%)	0.503 ^{MC}
	20-29	209 (79.5%)	210 (77.2%)	419 (78.3%)	
	30-37	37 (14.1%)	37 (13.6%)	74 (13.8%)	
	Mean $\pm$ SD	25.17 $\pm$ 3.6	25.11 $\pm$ 3.71	25.14 $\pm$ 3.65	0.847 ^t
	Median (Min, Max)	25 (19, 37)	25 (18, 36)	25 (18, 37)	
Gravida	Multigravida	141 (53.6%)	167 (61.4%)	308 (57.5%)	0.069 ^C
	Primigravida	122 (46.4%)	105 (38.6%)	227 (42.5%)	
Gestational age at delivery(weeks)	Mean $\pm$ SD	38.74 $\pm$ 2.45	38.56 $\pm$ 2.51	38.65 $\pm$ 2.48	0.407 ^t
	Median (Min, Max)	39.1 (3.6, 42)	39 (3.6, 41.2)	39.05 (3.6, 41.6)	

The commonest age wise distribution in Group A (79.5%) and B (77.2%) was between 20 to 29 years and the mean age was 25.14 ± 3.65 between two groups. Using Chi square test, the results were found to be insignificant ($p = 0.847^t$) and hence both groups were comparable.

With regard to obstetric history, multiparous women in group A were 141 (53.6%) and 167 (61.4%) in group B, whereas 122 (46.4%) women in Group A and 105 (38.6%) women in Group B were primiparous. Using chi square test the results were found to be statistically insignificant difference ($p=0.069^c$) and hence both groups were comparable

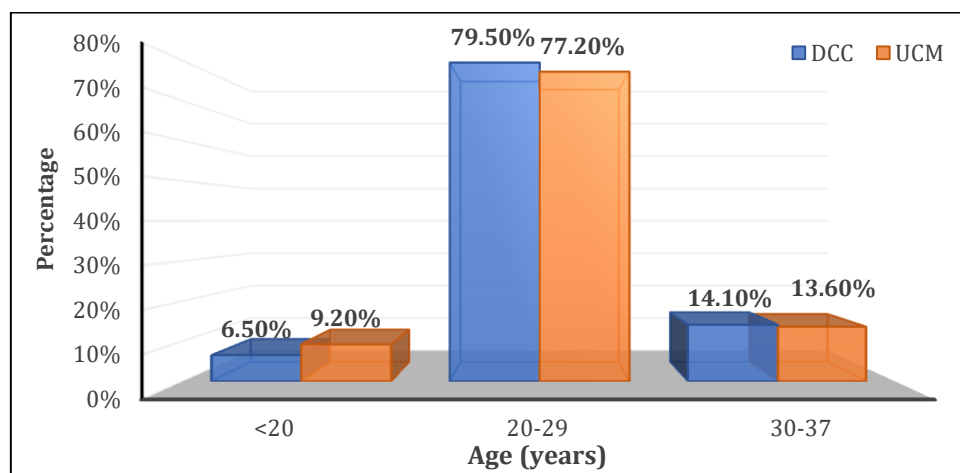


Figure 13 : Distribution of age over intervention groups

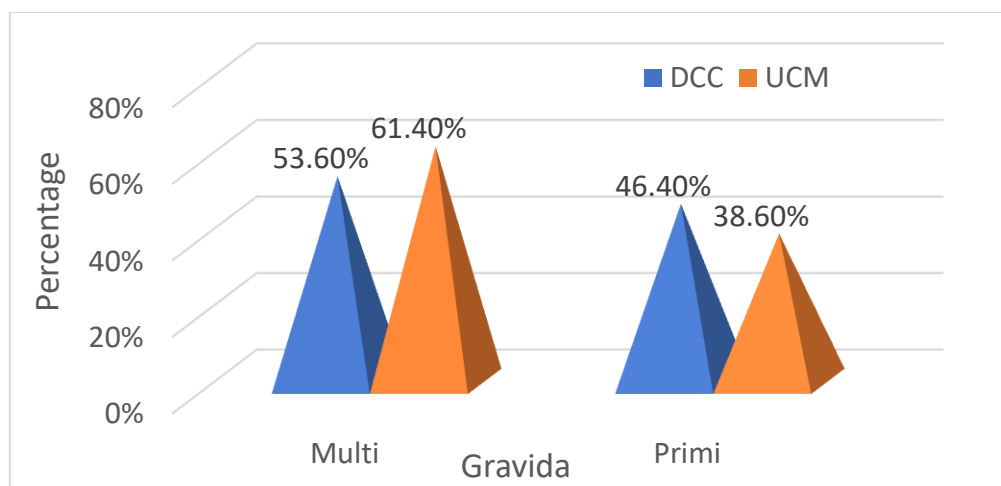


Figure 14: Distribution of gravida over intervention groups

The mean gestational age in group A (38.74 ± 2.45) and group B (38.56 ± 2.51) was not significant between two groups using two sample t test ($p = 0.407^t$) and hence both groups were comparable.

Table – 2 Comparison of parenteral iron correction between groups:

Variables	Sub Category	Intervention group		Total N= 535	p-value
		Group A(n-262)	Group B(n=272)		
Parenteral iron correction	No	207 (38.7%)	229 (38.7%)	436 (38.7%)	0.102 ^C
	Yes	56 (10.5%)	43 (15.8%)	99 (13.15%)	
2 nd Trimester Correction	No	247 (93.9%)	257 (94.5%)	504 (94.2%)	0.778 ^C
	Yes	16 (6.1%)	15 (5.5%)	31 (5.8%)	
3 rd Trimester Correction	No	223 (84.4%)	243 (89.3%)	466 (86.8%)	0.117 ^C

The above table shows the number of participants received parenteral iron correction in second and third trimesters of pregnancy.

Table 3 – Comparison of BMI between the groups:

Variables	Sub Category	Intervention group		Total N = 535	p-value
		Group A N= 263	Group B N=272		
BMI	Mean $\pm$ SD	27.56 $\pm$ 2.61	27.33 $\pm$ 2.5	27.43 $\pm$ 2.55	0.145 ^{MW}
	Median (Min, Max)	27.1 (2.1, 39.2)	27.1 (3.2, 38.4)	27.1 (2.1, 39.2)	

Using Mann Whitney U test, the mean BMI in Group A (27.56 $\pm$ 2.61) and B (27.33 $\pm$ 2.5) was insignificant (p= 0.145^{MW}) and hence the two groups were comparable.

Table 4 – Comparison of gestation over between groups

Variables	Sub Category	Intervention group		Total N=535	p-value
		Group A(n=263)	Group B(n=272)		
Term	No	9 (3.4%)	20 (7.4%)	29 (5.4%)	0.045 ^{C*}
	Yes	254 (96.6%)	252 (92.6%)	506 (94.6%)	
Preterm	No	254 (96.6%)	252 (92.6%)	506 (94.6%)	0.045 ^{C*}
	Yes	9 (3.4%)	20 (7.4%)	29 (5.4%)	

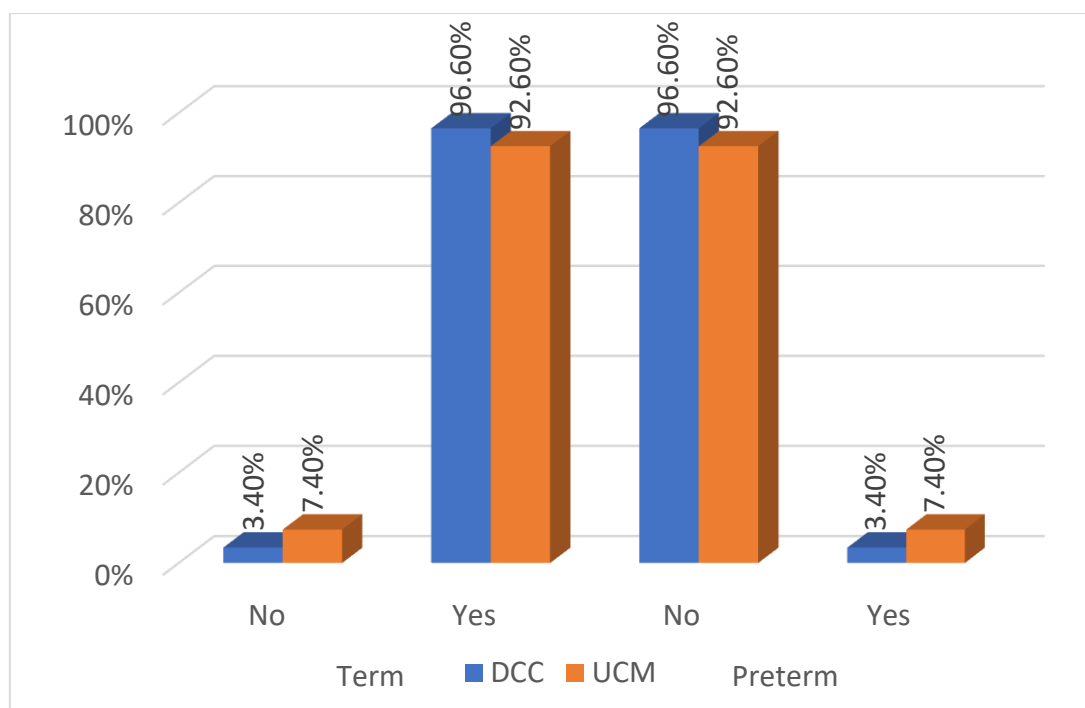


Figure 15: Distribution of period of gestation over intervention groups.

From the above table, in group A 96.6% were term gestation and in group B 96.6% were term gestation, whereas preterm gestation in group A were 3.4 % and in group B were 7.4%. The results were found to have **significant association** between two groups using Chi square test. ($p=0.045^{C*}$)

Table 5 – Comparison of mode of delivery between groups.

Variables	Sub Category	Intervention group		Total N=535	p-value
		Group A N=263	Group B N=272		
Mode of delivery- Normal vaginal delivery	No	115 (43.7%)	151 (55.5%)	266 (49.6%)	<0.001 ^{C*}
	Yes	148 (56.3%)	121 (44.5%)	269 (50.4%)	
Mode of delivery- LSCS	No	148 (56.3%)	121 (44.5%)	269 (50.4%)	<0.001 ^{C*}
	Yes	115 (43.7%)	151 (55.5%)	266 (49.6%)	

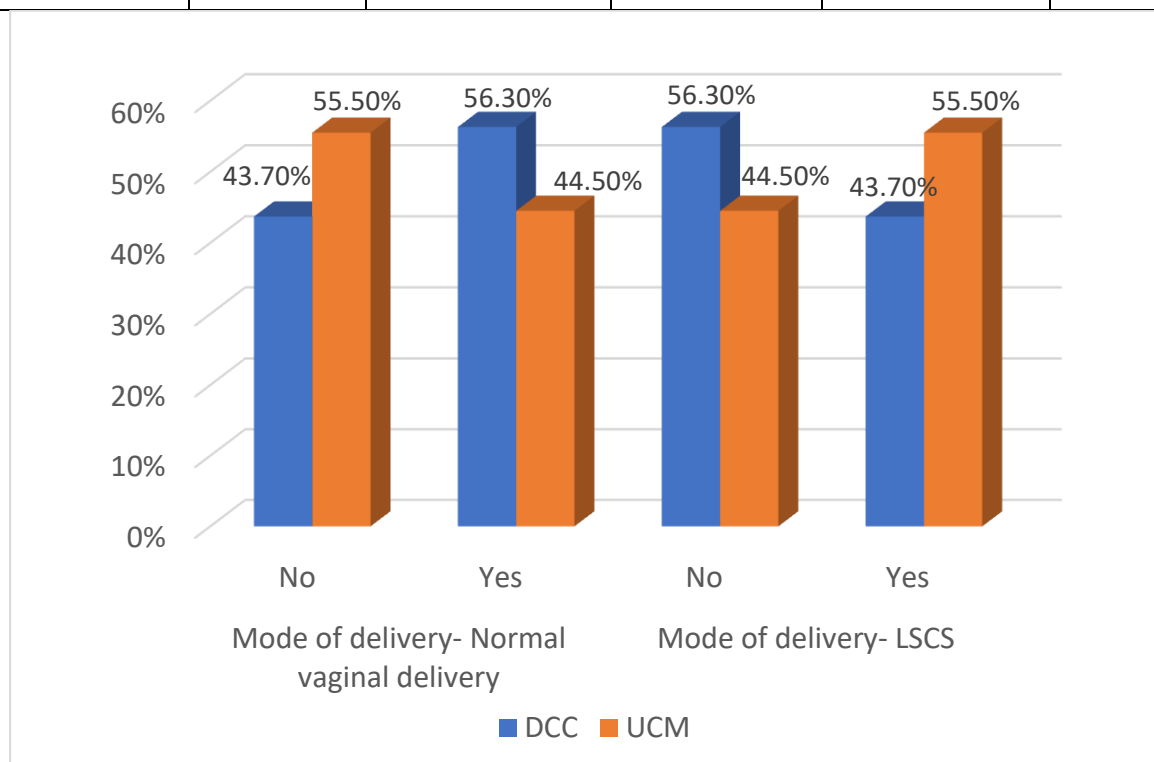


Figure 16: Distribution of mode of delivery over intervention groups.

When compared to mode of delivery, in group A, 56.3% underwent vaginal delivery and in group B, 44.5% underwent vaginal delivery. Whereas in group A, 43.7% underwent caesarean delivery and 55.5% underwent caesarean delivery in group B. From Chi square test, we observe that, there was **significant association** in the distribution of mode of delivery between two groups. ($p < 0.001$).

Table 6 – Comparison of average time period for cord clamping between groups

Variables	Sub Category	Intervention group		Total N= 535
		Group A	Group B	
DCC Duration done (seconds)#	Mean $\pm$ SD Median (Min, Max)	60	-	60
UCM Time period (seconds)#	Mean $\pm$ SD Median (Min, Max)	-	17 $\pm$ 2 15 (5, 20)	17.1 $\pm$ 2.47 15 (5, 20)
UCM done x times#	Mean $\pm$ SD Median (Min, Max)	-	6 $\pm$ 1 6 (5, 8)	6 $\pm$ 1 6 (5, 8)

From the above table, the mean duration of delayed cord clamping was 60 seconds and mean duration of cord milking was 17 seconds.

Table 7 – Comparison of maternal blood loss among groups

Variables	Sub Category	Intervention group		Total N=535	p-value
		Group A N=263	Group B N=272		
Blood loss(ml)	Mean $\pm$ SD	312.59 $\pm$ 133.14	311.36 $\pm$ 124.88	311.96 $\pm$	0.913t
	Median			128.88	
	(Min, Max)	300 (100, 750)	300 (100, 700)	300 (100, 750)	

The mean blood loss in group A(312.59 $\pm$ 133.14) and group B(311.36 $\pm$ 124.88) was not significant between two groups by two sample t test.(p= 0.913t).

Table 8 – Comparison of Haemoglobin between two groups

Variables	Sub Category	Intervention group		Total N=535	p-value
		Group A N=263	Group B N=272		
HB predelivery	Mean $\pm$ SD	12.49 $\pm$ 1.12	12.41 $\pm$ 1.06	12.45 $\pm$ 1.09	0.396 ^t
	Median (Min, Max)	12.6 (10, 15.8)	12.55 (10.2, 15)	12.57 (10, 15.8)	
HB postdelivery	Mean $\pm$ SD	10.73 $\pm$ 1.02	10.68 $\pm$ 0.95	10.7 $\pm$ 0.98	0.564 ^t
	Median (Min, Max)	10.6 (8.2, 13.7)	10.6 (8, 13.2)	10.6 (8, 13.7)	
Change in HB	Mean $\pm$ SD	1.76 $\pm$ 0.1	1.73 $\pm$ 0.11	1.74 $\pm$ 0.1	<0.001 ^{t*}
	Median (Min, Max)	2 (1.8, 2.1)	1.95 (2.2, 1.8)	1.97 (2, 1.95)	

The pre delivery haemoglobin in group A(12.49 $\pm$ 1.12) and group B (12.41 $\pm$ 1.06) was insignificant (p=0.396^t) using two sample t test.

The post delivery mean hemoglobin in group A (10.73 $\pm$ 1.02) and group B (10.68 $\pm$ 0.95) was insignificant(p=0.564^t) using two sample t test .

The drop in haemoglobin following delivery was higher in group A(1.76 $\pm$ 0.1) than group B (1.73 $\pm$ 0.11), which was statistically **significant** (p= <0.001^t) and implies higher blood loss in group A than group B using two sample t test.

However the estimated blood loss was not significant due to non-accountability of blood lost in soaked clothes, pads and gauzes used during deliveries.

Table 9 – Comparison of haematocrit between groups .

Variables	Sub Category	Intervention group		Total N=535	p-value
		Group A N=263	Group B N=272		
Hematocrit predelivery	Mean $\pm$ SD	36.84 $\pm$ 3.15	37.18 $\pm$ 2.55	37.01 $\pm$ 2.85	0.173 ^t
	Median (Min, Max)	38 (9, 42)	38.15 (28, 42)	38 (9, 42)	
Hematocrit postdelivery	Mean $\pm$ SD	32.29 $\pm$ 2.51	32.32 $\pm$ 2.34	32.3 $\pm$ 2.42	0.870 ^t
	Median (Min, Max)	32 (26.2, 39.2)	32 (27, 39)	32 (26.2, 39.2)	
Change in Hematocrit	Mean $\pm$ SD	4.55 $\pm$ 0.64	4.86 $\pm$ 0.21	4.71 $\pm$ 0.43	0.193 ^{WT}
	Median (Min, Max)	6 (-17.2, 2.8)	6.18 (1, 3)	6 (-17.2, 2.8)	

The pre and post-delivery haematocrit in both groups were not significant using two sample t test. The change in haematocrit observed after delivery between two groups showed no significant difference ($p=0.193^{\text{WT}}$) using Welch's t test.

Table 10 – Comparison of duration of third stage of labour among groups

Variables	Sub Category	Intervention group (N=535)		p-value
		Group A N=263	Group B N=272	
Duration of third stage of labour	Mean $\pm$ SD	3.03 $\pm$ 1.13	2.84 $\pm$ 1.14	0.07537 ^{MW}
	Median (Min, Max)	3.3(0.48,5.3)	3 (0.98, 5.02)	

Using Mann Whitney test, the mean duration of third stage of labour in both groups was not significant ($p=0.07537^{\text{MW}}$). In the present study, the third stage duration was a subjective measurement between two groups.

Table 11 – Comparison of postpartum hemorrhage percentage between groups

Variables	Sub Category	Intervention group		Total N=535	p-value
		Group A N=263	Group B N=272		
Post-partum haemorrhage (blood loss > 500 ml in normal vaginal delivery)	No	260 (98.9%)	271 (99.6%)	531 (99.25%)	0.299 ^C
	Yes	3 (1.1%)	1 (0.4%)	4 (0.75%)	
Post-partum haemorrhage (blood loss > 1000 ml in caesarean delivery)	Yes	0	0	0	0.325 ^C
	No	263 (100%)	272 (100%)	535 (99.8%)	

From the above table, 3 cases of group A and 1 case of Group B reported with blood loss > 500 ml in vaginal deliveries.

Table 12 – Comparison of additional uterotonics and procedures done for management of complications during third stage of labour between groups

Variables	Sub Category	Intervention group		Total N=535	p-value
		Group A(N=263)	Group B(N=272)		
Medical management uterotonics	No	222 (84.4%)	245 (90.1%)	467 (87.25%)	0.049^{C*}
	Yes	41 (15.6%)	27 (9.9%)	68 (12.75%)	
Hayman's stitch	No	260 (98.9%)	267 (98.2%)	527 (98.55%)	0.506 ^C
	Yes	3 (1.1%)	5 (1.8%)	8 (1.45%)	
B Lynch	No	262 (99.6%)	271 (99.6%)	533 (99.6%)	0.368 ^C
	Yes	0	1 (0.4%)	1 (0.2%)	
Uterine artery ligation	No	257 (97.7%)	266 (97.8%)	523 (97.75%)	0.953 ^C
	Yes	6 (2.3%)	6 (2.2%)	6 (2.25%)	

The additional administration of uterotonics showed significant association between two groups by Chi square test ($p=0.049^{C*}$) and it was higher in group A.

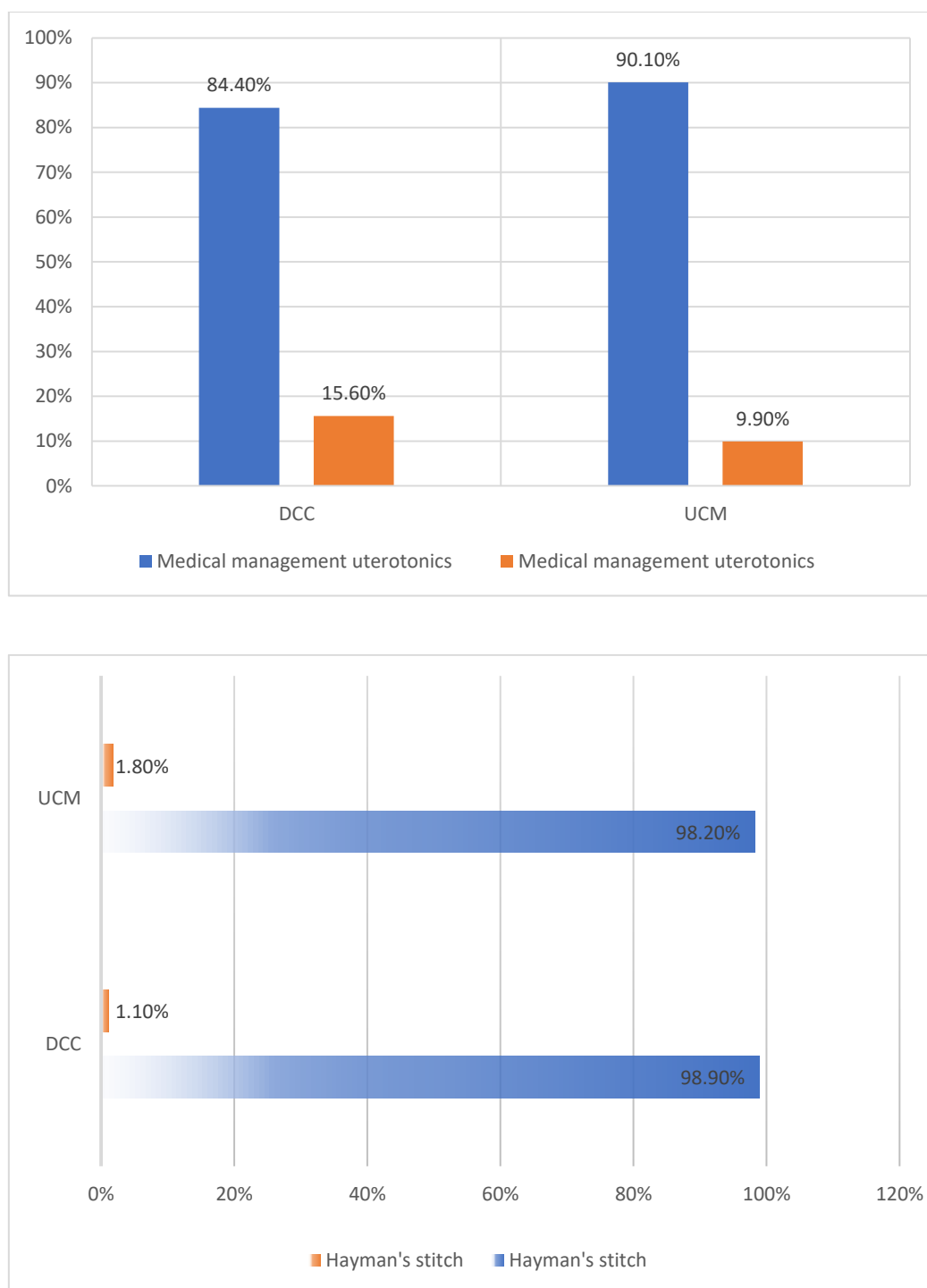


Figure 17: Distribution of Medical management uterotonics and Hayman's stitch over intervention groups

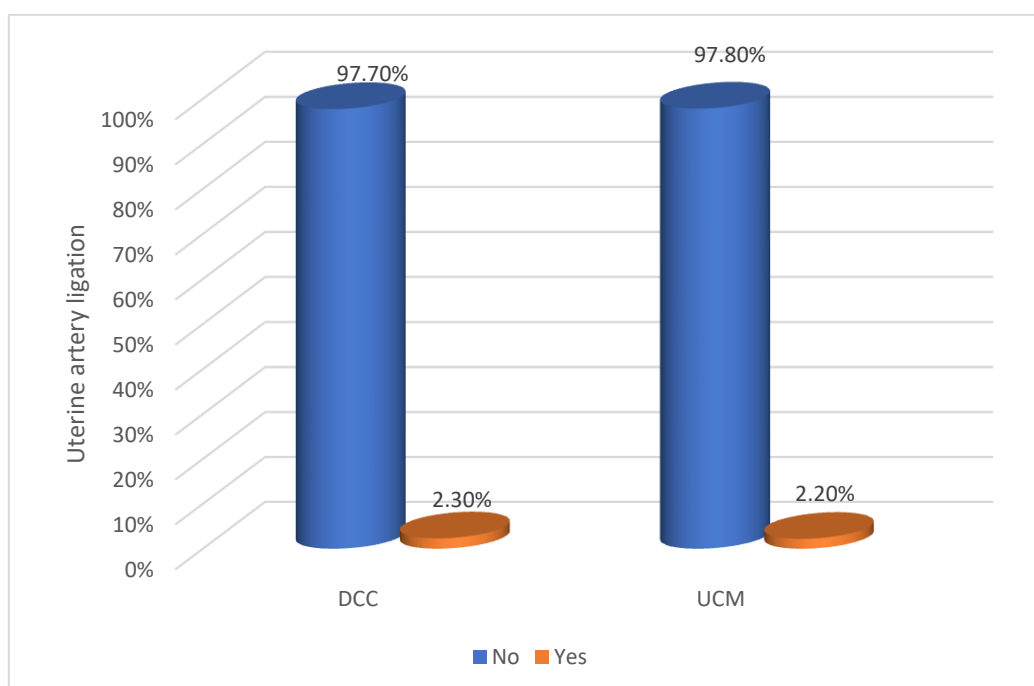
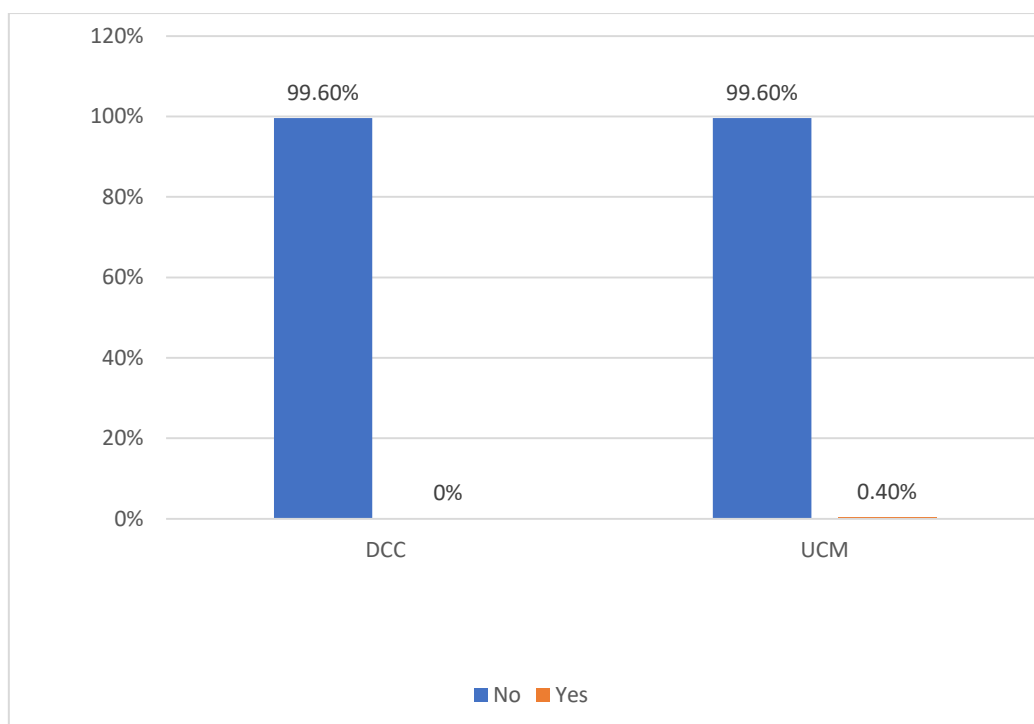


Figure 18: Distribution of B Lynch and uterine artery ligation over intervention groups.

Table 13 – Comparison of need for blood transfusion among groups

Variables	Sub Category	Intervention group		Total N=535	p-value
		Group A N=263	Group B N=272		
Need for Blood transfusion	No	256 (97.3%)	269 (98.9%)	525 (98.1%)	0.183 ^{C*}
	Yes	7 (2.7%)	3 (1.1%)	10 (1.9%)	

In Group A, 7 participants required the need for blood transfusion (2.7%) compared to group B (1.1%) which showed no significant association between groups by Chi square test ($p=0.183^{C*}$).

Table 14 – Indications of caesarean delivery

Indication of LSCS (N=256)	Group A	Group B
ANAMNIOS	0	1 (0.4%)
BREECH	5 (1.9%)	1 (0.4%)
BREECH IN LABOUR	0	1 (0.4%)
CDMR	16 (6.1%)	9 (3.3%)
COMPOUND PRESENTATION	1 (0.4%)	0
CPD	5 (1.9%)	8 (2.9%)
CPD WITH MACROSOMIA	0	1 (0.4%)
FAILED INDUCTION	7 (2.7%)	12 (4.4%)
FETAL DISTRESS	2 (0.8%)	12 (4.4%)
FETAL MACROSOMIA	2 (0.8%)	1 (0.4%)
NON-REASSURING NST	0	1 (0.4%)
NON-PROGRESS OF LABOUR	4 (1.5%)	10 (3.7%)
PREVIOUS 2 LSCS	9 (3.4%)	16 (5.9%)
PREVIOUS LSCS NOT WILLING FOR VBAC	59 (22.4%)	67 (24.6%)
PREVIOUS LSCS WITH PROM	1 (0.4%)	0
RHD	0	1 (0.4%)
SEVERE OLIGOHYDRAMNIOS	2 (0.8%)	2 (0.7%)
SHORT STATURE	0	1 (0.4%)
SUSPICIOUS TRACE	2 (0.8%)	6 (2.2%)
TRANSVERSE LIE	0	1 (0.4%)

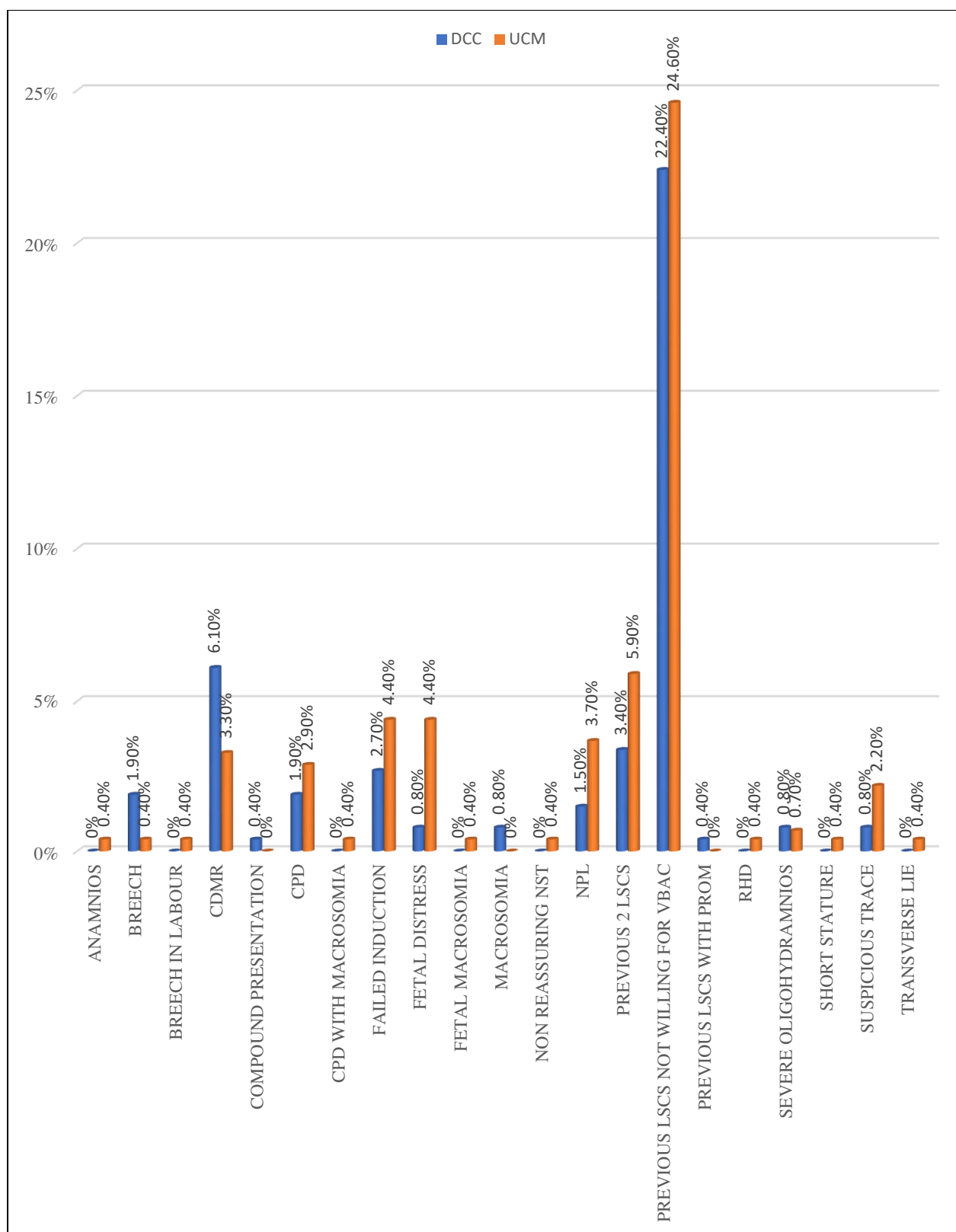


Figure 19: Distribution of subjects on Indication of LSCS over intervention group

SUB-ANALYSIS

Table 15 -Distribution of participants into two groups according to the mode of delivery

Variable	Subcategory	Normal vaginal delivery (N= 269)	Cesarean delivery (N=266)
Intervention Group	Group A	148 (55%)	115 (43.2%)
	Group B	121 (45%)	151 (56.8%)

A separate sub analysis compared both groups with respect to mode of delivery i.e. normal vaginal delivery and cesarean delivery.

Table 16 – Comparison of baseline characteristics among two groups in vaginal delivery

Variable	Sub category	Intervention group		p-value
		Group A (N=148)	Group B (N=121)	
Age	Mean $\pm$ SD	25 $\pm$ 3	24 $\pm$ 3	0.317 ^{MW}
	Median (Min, Max)	24 (19, 35)	24 (18, 33)	
Gravida	Multigravida	62 (41.9%)	62 (51.2%)	0.126 ^C
	Primigravida	86 (58.1%)	59 (48.8%)	

The mean age in group A and B was not significant and hence the two groups were comparable ($p=0.317^{\text{MW}}$) using Mann Whitney test. In group A, 41.9% women were multiparous and in group B 51.2% were multiparous. In group A, 58.1% women were primigravida and 48.8% in group B. However, the distribution was not significant ($p=0.126^{\text{C}}$) using Chi square test and comparable between two groups.

Table 17 – Comparison of cord clamping duration between two groups in vaginal delivery

Variable	Sub category	Intervention group	
		Group A N=148	Group B N=121
DCC Duration done (seconds)	Mean $\pm$ SD	60 $\pm$ 0 60 (60,60)	-
Milking Time period (seconds)	Mean $\pm$ SD Median (Min, Max)	-	17.55 $\pm$ 2.3 20 (15,20)
UCM done x times	5	0	31 (25.6%)
	6	0	53 (43.8%)
	7	0	31 (25.6%)
	8	0	6 (5%)

Table 18 – Comparison of Blood loss between two groups in vaginal delivery

Variable	Sub category	Intervention group		p-value
		Group A(N=148)	Group B(N=121)	
Blood loss(ml)	Mean $\pm$ SD	243 $\pm$ 109	217 $\pm$ 90	0.086 ^{MW}
	Median (Min, Max)	200 (100, 600)	200 (100, 500)	

The mean blood loss in group A and B was not significant($p=0.086^{\text{MW}}$) by Mann Whitney test.

Table 19 – Comparison of Haemoglobin and Haematocrit between two groups in vaginal delivery

Variable	Sub category	Intervention group		p-value
		Group A N=148	Group B N=121	
Pre op HB (mg/dl)	Mean $\pm$ SD	12.5 $\pm$ 1.1	12.3 $\pm$ 1.1	0.131 ^{MW}
	Median (Min, Max)	12.6 (10, 15.8)	12.4 (10.3, 14.9)	
Post op HB (mg/dl)	Mean $\pm$ SD	10.8 $\pm$ 1	10.8 $\pm$ 1	0.761 ^{MW}
	Median (Min, Max)	10.6 (8.8, 13.6)	10.6 (8, 13.2)	
Change in HB	Mean $\pm$ SD	1.71 $\pm$ 0.83	1.56 $\pm$ 0.65	0.193 ^{MW}
	Median (Min, Max)	1.6 (0.1, 4)	1.5 (0.1, 3.2)	
Pre op haematocrit	Mean $\pm$ SD	36.8 $\pm$ 3.4	37.2 $\pm$ 2.6	0.518 ^{MW}
	Median (Min, Max)	38 (9, 41.1)	38.2 (30.2, 42)	
Post op haematocrit	Mean $\pm$ SD	32.6 $\pm$ 2.5	32.5 $\pm$ 2.4	0.8 ^{MW}
	Median (Min, Max)	32 (27, 39)	32 (27, 38)	
Change in haematocrit	Mean $\pm$ SD	4.25 $\pm$ 3.32	4.72 $\pm$ 2.2	0.283 ^{MW}
	Median (Min, Max)	4.1 (-25, 11.9)	4.7 (0.7, 11.2)	

Pre and post operative Hemoglobin in group A and B was not significant. The change in Haemoglobin and haematocrit following delivery was not significant between the groups.

Table 20 – Comparison of third stage and PPH between two groups in vaginal delivery

Variable	Sub category	Intervention group		p-value
		Group A N=148	Group B N=121	
Duration of third stage of labour	Mean $\pm$ SD	3.61 $\pm$ 0.84	3.55 $\pm$ 0.96	0.994 ^{MW}
	Median (Min, Max)	3.78 (1.34, 5.3)	3.56 (1.22, 5.02)	
PPH (Blood Loss > 500 ml)	No	145 (98%)	120 (99.2%)	0.418 ^C
	Yes	3 (2%)	1 (0.8%)	

The duration of third stage of labor in group A and B not significant by Mann Whitney test ($p=0.994^{\text{MW}}$).

Table 21 - Comparison of Baseline variables among two groups in Cesarean delivery

Variable	Sub category	Intervention group		p-value
		Group A (N=115)	Group B (N=151)	
Age	Mean $\pm$ SD	26 $\pm$ 4	26 $\pm$ 4	0.990 ^{MW}
	Median (Min, Max)	25 (19, 37)	25 (19, 36)	
Gravida	Multigravida	79 (68.7%)	105 (69.5%)	0.883 ^C
	Primigravida	36 (31.3%)	46 (30.5%)	
DCC Duration done (seconds)	Mean $\pm$ SD	60 $\pm$ 0		-
	Median (Min, Max)	60 (60,60)		
UCM Time period (seconds)	Mean $\pm$ SD	-	16.7 $\pm$ 2.5	0.236 ^C
	Median (Min, Max)		15(5,20)	
UCM done x times	5		62 (40.7%)	0.286 ^C
	6		52 (34.7%)	
	7		32 (21.3%)	
	8		5 (3.3%)	

The mean age in group A and B was not significant ($p=0.990^{\text{MW}}$) using Mann Whitney test and both groups were comparable.

The mean duration of cord clamping in group A was 60 seconds in group A. The mean duration of milking in group B was 16.7 seconds

Table 22– Comparison of blood loss between two groups in cesarean delivery

Variable	Sub category	Intervention group		p-value
		Group A (N=115)	Group B (N=151)	
Blood loss(ml)	Mean $\pm$ SD	402 $\pm$ 107	387 $\pm$ 93	0.315 ^{MW}
	Median (Min, Max)	400 (200, 750)	400 (220, 700)	

The mean blood loss in group A (402 $\pm$ 107) and group B (387 $\pm$ 93) was not significant (p=0.315^{MW}) by Mann Whitney test.

Table 23 – Comparison of Hemoglobin and Hematocrit between two groups in cesarean delivery

Variable	Sub category	Intervention group		p-value
		Group A(N=115)	Group B(N=151)	
Pre op HB (mg/dl)	Mean $\pm$ SD Median (Min, Max)	12.4 $\pm$ 1.1 12.5 (10.4, 15.4)	12.5 $\pm$ 1 12.6 (10.2, 15)	0.660 ^{MW}
Post op HB (mg/dl)	Mean $\pm$ SD Median (Min, Max)	10.6 $\pm$ 1.05 10.6 (8.2, 13.7)	10.61 $\pm$ 0.89 10.5 (8.6, 12.6)	0.794 ^{MW}
Change in HB	Mean $\pm$ SD Median (Min, Max)	1.81 $\pm$ 0.97 1.7 (-1.2, 5.1)	1.85 $\pm$ 0.86 1.7 (0.2, 5)	0.839 ^{MW}
Pre op hematocrit	Mean $\pm$ SD Median (Min, Max)	36.9 $\pm$ 2.7 38 (30, 42)	37.1 $\pm$ 2.5 38 (28, 41.2)	0.3 ^{MW}
Post op hematocrit	Mean $\pm$ SD Median (Min, Max)	31.9 $\pm$ 2.48 32 (26.2, 39.2)	32.16 $\pm$ 2.26 32 (27, 39)	0.252 ^{MW}
Change in hematocrit	Mean $\pm$ SD Median (Min, Max)	4.93 $\pm$ 2.78 4.9 (-2, 12)	4.96 $\pm$ 2.21 5 (-2, 12.8)	0.877 ^{MW}

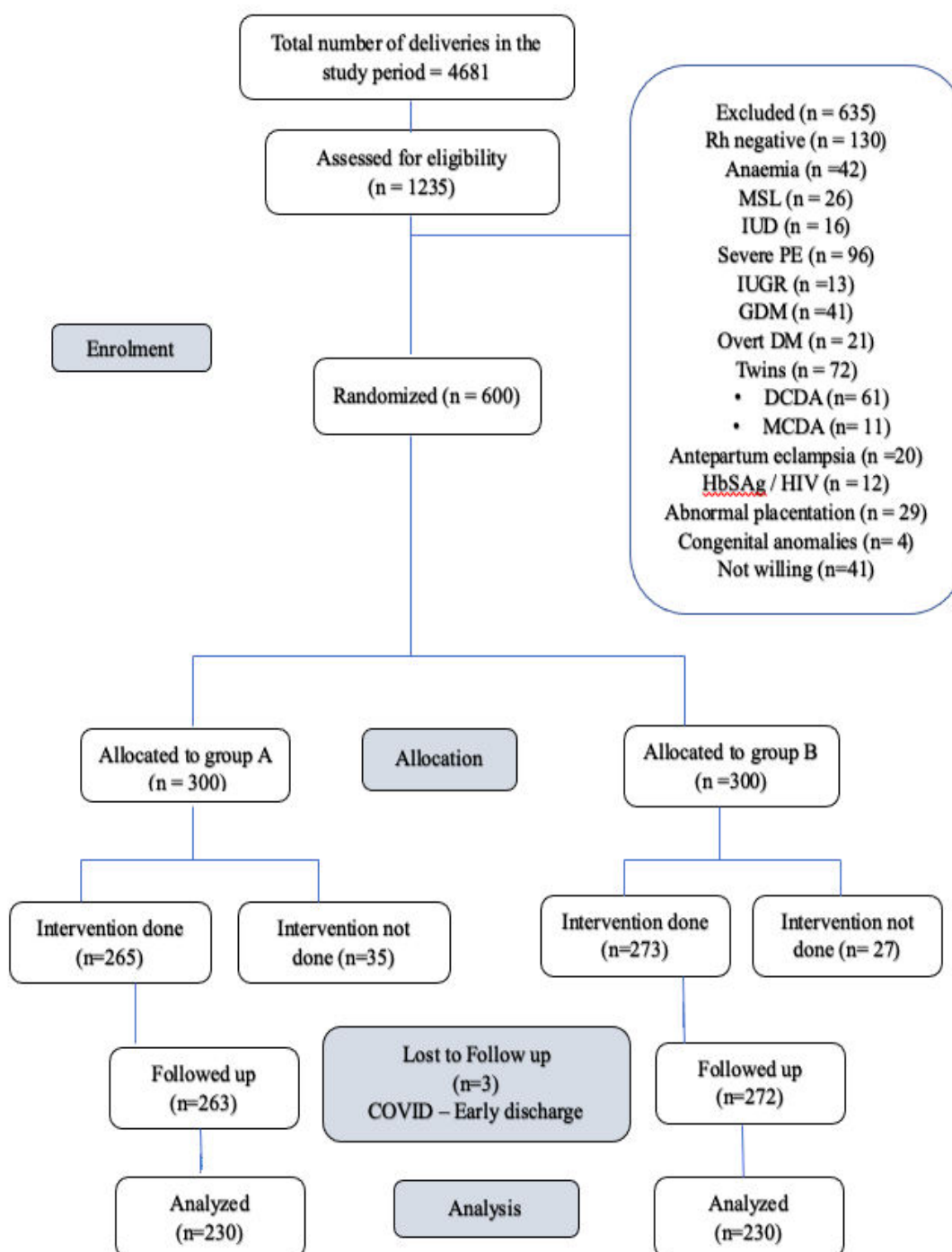
Pre and post-operative Hemoglobin and hematocrit in group A and B was not significant. The change in Haemoglobin and hematocrit following delivery was not significant by Mann Whitney test.

Table 24 – Comparison of third stage and additional management used between two groups in cesarean delivery

Variable	Sub category	Intervention group		p-value
		Group A(N=115)	Group B(N=151)	
Duration of third stage of labour	Mean $\pm$ SD	2.28 $\pm$ 1	2.27 $\pm$ 0.94	0.9666 ^{MW}
	Median (Min, Max)	2.14 (0.48, 4.2)	2.15 (0.98, 4.3)	
PPH (Blood loss > 1000 ml)	-	-	-	-
Hayman's Stitch	No	112 (97.4%)	146 (96.7%)	0.74 ^C
	Yes	3 (2.6%)	5 (3.3%)	
B Lynch	No	115 (100%)	150 (99.3%)	0.382 ^C
	Yes	0	1 (0.7%)	
Uterine Artery Ligation	No	109 (94.8%)	145 (96%)	0.628 ^C
	Yes	6 (5.2%)	6 (4%)	

The mean duration of third stage of labor in group A and B was not significant between two groups by Mann Whitney test ($p=0.9666^{\text{MW}}$).

CONSORT diagram (Consolidated Standards of Reporting Trials)



The following are the results of **460 participants** with equal number of subjects in both groups

Table 25 – Age wise distribution between two groups:

Variables	Subcategory	Intervention group		Total N= 460	p-value
		Group A(n=230)	Group B(n=230)		
Age (years)	<20	6(2.6%)	8(3.47%)	14(3.043%)	0.698 ^c
	20-29	191(83.04%)	194(84.3%)	385(83.69%)	
	30-37	33(14.3%)	28(12.17%)	61(13.26%)	
	Mean $\pm$ SD Median (Min, Max)	25.2 $\pm$ 3.6 (19 – 37)	25.0 $\pm$ 3.7 (18 – 36)	25.1 $\pm$ 3.7 (25.1 $\pm$ 3.7)	0.557 ^t
Gravida	Multigravida	123(53.4%)	136(59.1%)	259(56.3%)	0.221 ^c
	Primigravida	107(46.5%)	94(40.9%)	201(43.7%)	
Gestational age at delivery(weeks)	Mean $\pm$ SD Median (Min, Max)	38.8 $\pm$ 1.1 (35 – 42)	38.6 $\pm$ 1.3 (34 – 41)	38.7 $\pm$ 1.2 (34 – 42)	0.075 ^t
BMI	Mean $\pm$ SD Median (Min, Max)	27.6 $\pm$ 2.2 (21.0 - 39.2)	27.3 $\pm$ 2.1 (22.9 - 38.4)	27.4 $\pm$ 2.7 (21.0 - 39.2)	0.135 ^t

Table 26 – Comparison of gestation over between groups

Variables	Sub Category	Intervention group		Total N=460	p-value
		Group A(n=230)	Group B (n=230)		
Preterm	Yes	4(1.73%)	8(3.5%)	12(2.6%)	0.380 ^C
Term	Yes	226(98.3%)	222(96.5%)	448(97.4%)	
LSCS	Yes	115(50%)	115(50%)	230(50%)	1.000 ^C
Vaginal delivery	Yes	115(50%)	115(50%)	230(50%)	

Table 27 – Comparison of average time period for cord clamping between groups

Variables	Sub Category	Intervention group	
		Group A(n=230)	Group B(n=230)
DCC Duration done (seconds)#	Mean ± SD	60	-
UCM Time duration (seconds)#	Mean ± SD	-	17 ± 2.4
	Median (Min, Max)		15 – 20
UCM done x times#	Mean ± SD	-	5.9 ± 0.8
	Median (Min, Max)		(5 - 8)

Table 71 – Comparison of maternal blood loss and Haematological parameters between two groups

Variables	Sub Category	Intervention group		Total N=460	p-value
		Group A(n=230)	Group B (n=230)		
Blood loss(ml)	Mean $\pm$ SD Median (Min, Max)	324.8 $\pm$ 134.0 300(100 – 750)	308.0 $\pm$ 120.0 300(100 – 700)	316.4 $\pm$ 127.3 300(100 – 750)	0.157 ^t
HB predelivery	Mean $\pm$ SD (Min, Max)	12.5 $\pm$ 1.1 (10.0 - 15.4)	12.5 $\pm$ 1.1 (10.3 - 15.0)	12.5 $\pm$ 1.1 (10.0 - 15.4)	1.000 ^t
HB postdelivery	Mean $\pm$ SD (Min, Max)	10.7 $\pm$ 1.0 (8.2 - 13.7)	10.7 $\pm$ 0.9 (8.0 - 13.0)	10.7 $\pm$ 1.0 (8.0 - 13.7)	1.000 ^t
Change in HB	Mean $\pm$ SD (Min, Max)	1.8 $\pm$ 0.9 (0.1 - 5.1)	1.8 $\pm$ 0.8 (0.1 - 5.0)	1.8 $\pm$ 0.9 (0.1 - 5.1)	1.000 ^t
Hematocrit predelivery	Mean $\pm$ SD (Min, Max)	37.0 $\pm$ 2.6 (30.4 - 40.0)	37.0 $\pm$ 2.5 (30.0 - 41.1)	37.0 $\pm$ 2.6 (30.0 - 41.1)	1.000 ^t
Hematocrit postdelivery	Mean $\pm$ SD (Min, Max)	32.2 $\pm$ 2.5 (26.2 - 39.2)	32.3 $\pm$ 2.3 (27.0 - 39.0)	32.3 $\pm$ 2.4 (26.2 - 39.2)	0.655 ^t
Change in Hematocrit	Mean $\pm$ SD (Min, Max)	4.7 $\pm$ 2.5 (0.0 - 12.0)	4.7 $\pm$ 2.1 (0.4 - 12.8)	4.7 $\pm$ 2.3 (0.0 - 12.8)	1.000 ^t

The drop in haemoglobin following delivery showed no significant difference between two groups (p=1.000). The change in haematocrit following delivery showed no significant difference (p=1.000) using two sample t test.

Table 29 – Comparison of third stage duration and postpartum hemorrhage percentage between groups

Variables	Sub Category	Intervention group		Total N=460	p-value
		Group A (n=230)	Group B(n=230)		
Duration of third stage of labour	Mean ± SD (Min, Max)	2.9 ±1.2 (0.48 - 5.3)	3.0 ± 1.1 (0.98 - 5.02)	3.0 ± 1.1 (0.48 - 5.3)	0.352 ^t
Post-partum haemorrhage (blood loss > 500 ml in vaginal delivery)	No	111(96.5%)	114(99.57 %)	225(97.82%)	0.368 ^c
	Yes	4(3.47%)	1(0.43%)	5(2.17%)	
Post-partum haemorrhage (blood loss > 1000 ml in caesarean delivery)	Yes	0	0	0	1.000 ^{PE}
	No	115(100%)	115(100%)	230(100%)	

Table 30 – Comparison of additional uterotonics and procedures done for management of complications during third stage of labour between groups

Variables	Sub Category	Intervention group		Total N=460	p-value
		Group A (n=230)	Group B (n=230)		
Medical management uterotonics	Yes	29(12.6%)	24(10.4%)	53(11.5%)	0.559
	No	201(87.4%)	206(89.6%)	407(88.5%)	
Hayman's stitch	Yes	3(1.3%)	5(2.17%)	8(1.73%)	0.721
	No	227(98.7%)	225(97.8%)	452(98.2%)	
B Lynch	No	230(100%)	229(99.5%)	459(99.7%)	1.000
	Yes	0	1(0.5%)	1 (0.21%)	
Uterine artery ligation	No	224(97.4%)	224(97.4%)	448(97.39)	1.000
	Yes	6 (2.6%)	6 (2.6%)	12(2.6%)	

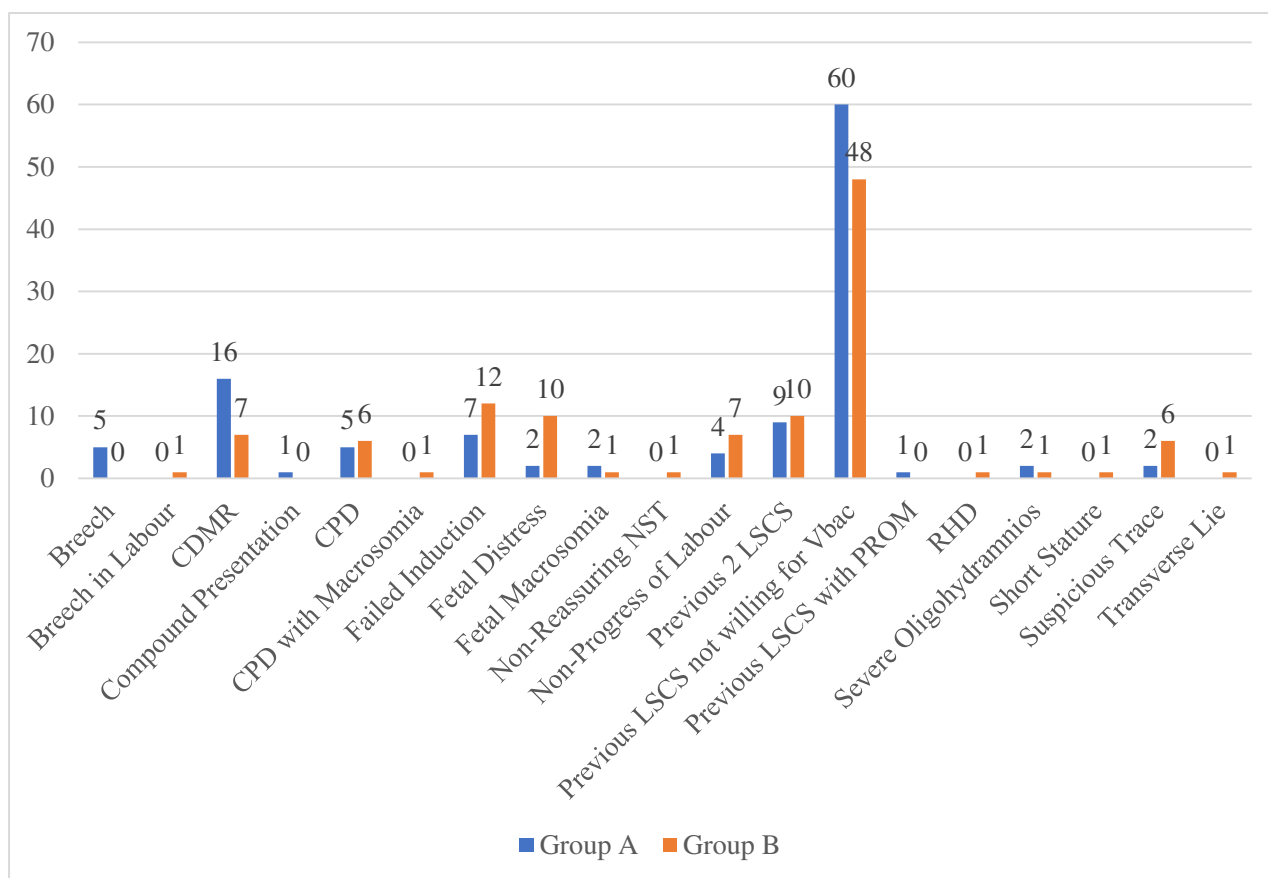
Table 31 – Comparison of need for blood transfusion among groups

Variables	Sub Category	Intervention group		Total N=460	p-value
		Group A (n=230)	Group B (n=230)		
Need for Blood transfusion	Yes	7(3%)	3(1.3%)	10(2.1%)	0.337 ^c
	No	223(96.9)	227(98.7%)	450(97.8%)	

Table 32 – Indications of caesarean delivery

Indication of LSCS	Intervention group				Total (N= 230)	
	Group A (N=115)		Group B (N=115)			
	N	%	N	%	N	%
Breech	5	4.3	0	0.0	5	2.2
Breech in Labour	0	0.0	1	0.9	1	0.4
CDMR	16	13.9	7	6.1	23	10.0
Compound Presentation	1	0.9	0	0.0	1	0.4
CPD	5	4.3	6	5.2	11	4.8
CPD with Macrosomia	0	0.0	1	0.9	1	0.4
Failed Induction	7	6.1	12	10.4	19	8.3
Fetal Distress	2	1.7	10	8.7	12	5.2
Fetal Macrosomia	2	1.7	1	0.9	3	1.3
Non-Reassuring NST	0	0.0	1	0.9	1	0.4
Non-Progress of Labour	4	3.5	7	6.1	11	4.8
Previous 2 LSCS	9	7.8	10	8.7	19	8.3
Previous LSCS not willing for VBAC	60	52.2	48	41.7	108	47.0
Previous LSCS with PROM	1	0.9	0	0.0	1	0.4
RHD	0	0.0	1	0.9	1	0.4
Severe Oligohydramnios	2	1.7	1	0.9	3	1.3
Short Stature	0	0.0	1	0.9	1	0.4
Suspicious Trace	2	1.7	6	5.2	8	3.5
Transverse Lie	0	0.0	1	0.9	1	0.4

Figure 20 : Distribution of subjects on Indication of LSCS over intervention group



SUB-ANALYSIS

Table 33 - Distribution of participants into two groups according to the mode of delivery

Variable	Subcategory	Normal vaginal delivery (N= 230)	Cesarean delivery (N=230)
Intervention Group	Group A	115(50%)	115(50%)
	Group B	115(50%)	115(50%)

Table 34– Comparison of baseline characteristics among two groups in vaginal delivery

Variable	Sub category	Intervention group		p-value
		Group A (N=115)	Group B (N=115)	
Age	Mean $\pm$ SD	24.7 $\pm$ 3.4	24.4 $\pm$ 3.6	0.516 ^t
	(Min, Max)	(19 – 35)	(18 – 33)	
Gravida	Multigravida	44(38.3%)	57(49.6%)	0.110 ^c
	Primigravida	71(61.73)	58(50.43%)	

Table 35 – Comparison of maternal blood loss and haematological parameters between two groups in vaginal delivery

Variable	Sub category	Intervention group		p-value
		Group A N=115	Group B N=115	
Blood loss(ml)	Mean $\pm$ SD (Min, Max)	247.3 $\pm$ 113.2 (100 – 600)	233.9 $\pm$ 90.6 (100 – 540)	0.322 ^t
Pre op HB (mg/dl)	Mean $\pm$ SD	12.6 $\pm$ 1.1	12.4 $\pm$ 1.0	0.151 ^t
Post op HB (mg/dl)	Mean $\pm$ SD	10.8 $\pm$ 1.0	10.7 $\pm$ 1.0	0.407 ^t
Change in HB	Mean $\pm$ SD	1.8 $\pm$ 0.8	1.7 $\pm$ 0.7	0.294 ^t
Pre op haematocrit	Mean $\pm$ SD	37.1 $\pm$ 2.5	37.2 $\pm$ 2.6	0.756 ^t
Post op haematocrit	Mean $\pm$ SD	32.5 $\pm$ 2.6	32.4 $\pm$ 2.4	0.747 ^t
Change in haematocrit	Mean $\pm$ SD	4.6 $\pm$ 2.3	4.8 $\pm$ 2.3	0.731 ^t
Duration of third stage of labour	Mean $\pm$ SD (Min, Max)	3.6 $\pm$ 0.9 (1.3 - 5.3)	3.6 $\pm$ 1.4 (1.2 - 5.0)	1.000 ^t

Table 36 - Comparison of Baseline variables among two groups in Cesarean delivery

Variable	Sub category	Intervention group		p-value
		Group A (N=115)	Group B (N=115)	
Age	Mean $\pm$ SD	25.7 $\pm$ 3.7	25.6 $\pm$ 3.8	0.839 ^t
	(Min, Max)	(19.0 - 37.0)	(19.0 - 36.0)	
Gravida	Multigravida	79 (50 %)	79(50 %)	1.000 ^C
	Primigravida	36 (50%)	36(50 %)	

Table 37 – Comparison of Hemoglobin and Hematocrit between two groups in cesarean delivery

Variable	Sub category	Intervention group		p-value
		Group A(N=115)	Group B(N=115)	
Blood loss(ml)	Mean $\pm$ SD	402.3 $\pm$ 105.4	382.0 $\pm$ 98.2	0.132 ^t
	(Min, Max)	(250 – 750)	(220 – 700)	
Pre op HB (mg/dl)	Mean $\pm$ SD	12.4 $\pm$ 1.1	12.6 $\pm$ 1.1	0.151 ^t
Post op HB (mg/dl)	Mean $\pm$ SD	10.6 $\pm$ 1.0	10.7 $\pm$ 0.9	0.407 ^t
Change in HB	Mean $\pm$ SD	1.8 $\pm$ 0.9	1.9 $\pm$ 0.9	0.294 ^t
Pre op hematocrit	Mean $\pm$ SD	36.9 $\pm$ 2.7	36.9 $\pm$ 2.5	0.756 ^t
Post op hematocrit	Mean $\pm$ SD	32.0 $\pm$ 2.5	32.2 $\pm$ 2.1	0.747 ^t
Change in hematocrit	Mean $\pm$ SD	4.9 $\pm$ 2.7	4.7 $\pm$ 2.0	0.731 ^t

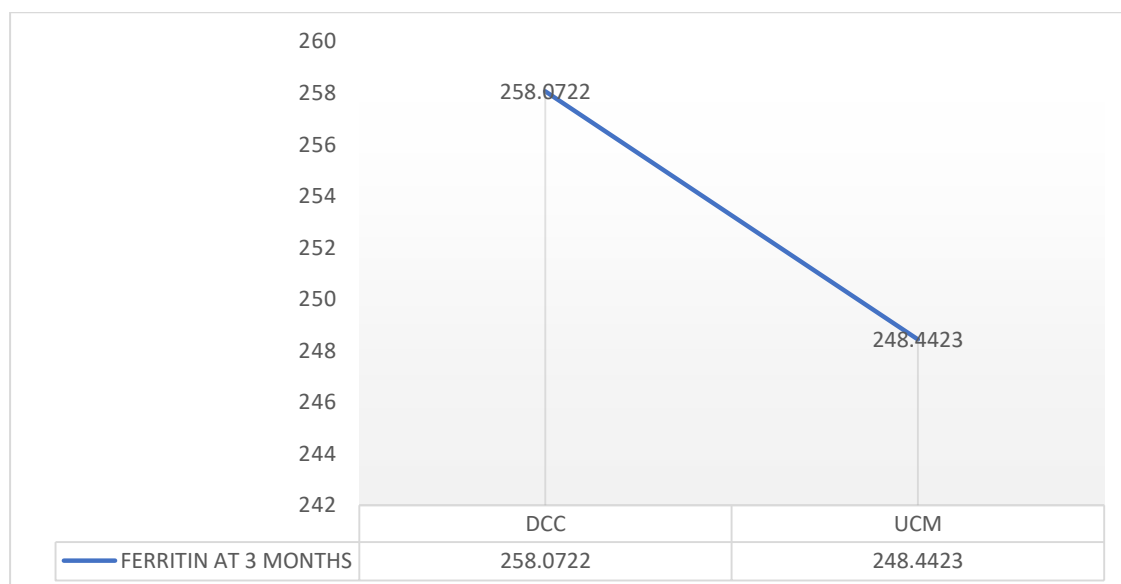
Table 38– Comparison of third stage and additional management used between two groups in cesarean delivery

Variable	Subcategory	Intervention group		p-value
		Group A(N=115)	Group B(N=115)	
Duration of third stage of labour	Mean ± SD	2.3 ± 1.0	2.5 ± 0.9	0.112 ^t
	(Min, Max)	(0.5 - 4.2)	(0.9 - 4.3)	
Hayman's Stitch	No	112(97.3%)	110(95.6%)	0.718 ^C
	Yes	3 (2.6%)	5 (4.34%)	
B Lynch	No	115 (100%)	114(99.1%)	1.0000 ^{PE}
	Yes	0	1 (0.86%)	
Uterine Artery Ligation	No	109(94.7%)	109 (94.7%)	1.000 ^C
	Yes	6 (5.2%)	6 (5.2%)	

NEONATAL OUTCOMES:

Comparison of Ferritin levels of infants at 3rd month of life between two groups:

	Groups	Total (N=108)	Mean	SD	P Value
Ferritin at 3 rd month	Group A	63	258.0722	133.70935	0.72
	Group B	45	248.4423	141.74276	



The mean serum ferritin levels at 3rd month of life in group A was 258.07 and in group B was 248.44. The mean difference was 9.63, which was not significant between two groups (p=0.72)

DISCUSSION

The third stage of labour is defined as the time period from the delivery of the fetus to the complete expulsion of the placenta and membranes. One of the complications of the third stage is post-partum haemorrhage (PPH) leading to maternal morbidity and mortality. World Health Organization defined post-partum haemorrhage (PPH) as blood loss of more than 500 mL with severe haemorrhage as a loss of blood of more than 1000 mL and a blood loss of more than 2500 ml is considered as very severe haemorrhage. Uterine atony, which is the failure of the uterus to contract results in PPH.

Active management was implemented in third stage of labour to reduce the risk of post-partum haemorrhage. It includes administration of uterotonics, controlled traction of cord and removal of placenta, massage of the uterus and recently World Health Organization (WHO) emphasized on delayed clamping of the cord. The ideal timing of cord clamping is still debated and controversial. The optimal timing of cord clamping helps in enhanced placental transfusion to the neonates and prevents anaemia due to iron deficiency in first few months of life.

This randomized controlled trial was carried out in the department of Obstetrics and Gynaecology, KLE'S Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi.

1. During the study period, out of 600 participants, 535 participants underwent the intervention and 65 did not undergo due to various reasons as mentioned below.
2. 263 subjects in DCC group and 272 subjects in UCM group were analysed.
3. A separate sub analysis was done to compare amongst the two groups with respect to mode of delivery i.e. vaginal and caesarean delivery.

Table 39. Comparison of baseline characteristics with other studies:

In the present study:

Variables	Sub Category	Intervention group		Total N= 535	p-value
		DCC N=263	UCM N=272		
Age (years)	<20	17 (6.5%)	25 (9.2%)	42 (7.9%)	0.503 ^{MC}
	20-29	209 (79.5%)	210 (77.2%)	419 (78.3%)	
	30-37	37 (14.1%)	37 (13.6%)	74 (13.8%)	
	Mean $\pm$ SD Median (Min, Max)	25.17 $\pm$ 3.6 25 (19, 37)	25.11 $\pm$ 3.71 25 (18, 36)	25.14 $\pm$ 3.65 25 (18, 37)	0.847 ^t
Gravida	Multigravida	141 (53.6%)	167 (61.4%)	308 (57.5%)	0.069 ^C
	Primigravida	122 (46.4%)	105 (38.6%)	227 (42.5%)	
Gestational age at delivery(weeks)	Mean $\pm$ SD Median (Min, Max)	38.74 $\pm$ 2.45 39.1 (3.6, 42)	38.56 $\pm$ 2.51 39 (3.6, 41.2)	38.65 $\pm$ 2.48 39.05 (3.6, 41.6)	0.407 ^t
BMI	Mean $\pm$ SD Median (Min, Max)	27.56 $\pm$ 2.61 27.1 (2.1, 39.2)	27.33 $\pm$ 2.5 27.1 (3.2, 38.4)	27.43 $\pm$ 2.55 27.1 (2.1, 39.2)	0.145 ^{MW}

In the present study, the baseline demographic variables like age , gravida, obstetric history, BMI were well matched in both groups

Table 40. Comparison of baseline characteristics with other studies:

<i>Trials</i>	<i>Present study</i>	<i>Rhoades et al</i> ¹²⁹	<i>Panburana et al</i> ⁷⁰	<i>Purisch et al</i> ⁸²	<i>De Paco et al</i> ¹²⁷
Comparison	DCC Vs UCM	With and without implementation of DCC	DCC Vs UCM	DCC Vs ICC	ECC vs DCC
Sample size	600	682	168	113	97
Age	DCC- 25.17 UCM- 25.11 p=0.503	Pre protocol –27.5 Post protocol-27.7 P =0.75	UCM -29 DCC-29.2 P=0.81	DCC=31.6 ICC=33.5	ECC-31.46 DCC-30.18 P=0.272
Gestational age	DCC- 39.1 UCM – 39 P=0.407	Pre protocol –39 Post protocol-39 P =0.25	UCM-39.1 DCC-39 P=0.95	DCC- 39.1 ICC-39.1	ECC-39.6 DCC-39.5 P=0.519
BMI	DCC- 27.1 UCM -27.1 p = 0.145	BMI>30kg/m ² Pre protocol –202 Post protocol-205	DCC- 22.5 UCM-22.4 P=0.91	DCC= 27.9 ICC=26.6	ECC=27.4 DCC-28.8 P=0.150

Similarly, the baseline demographic variables like age, gravida, BMI, obstetric history were well matched in other studies^{70,82,127,129}.

Table 41. Comparison of mode of delivery with other studies:

Subcategory	Vaginal delivery (N= 269)	Cesarean delivery (N=266)	Total N=535	P value
DCC	148 (55%)	115 (43.2%)	269 (50.4%)	<0.001
UCM	121 (45%)	151 (56.8%)	266 (49.6%)	

In the present study , the mode of delivery had **significant association** between two groups as the participants were randomised before the delivery i.e. at the time of admission.

A similar study¹⁰⁶, compared early cord clamping vs delayed cord clamping among 449 participants in term caesarean deliveries showed significant association in the mode of delivery

1. It was a retrospective cohort study
2. The rate of caesarean section was higher in ECC group compared to DCC group which can most likely be secondary to the theoretical risk and logistic difficulty of performing the DCC procedure in operative delivery, so the procedure was less likely to be performed during cesarean section.
3. The higher rate of caesarean section in ECC may also be associated with multiple pregnancies with advanced gestational age that elective caesarean section was selected as a delivery method.

In other similar studies^{70,82,129,130}, the mode of delivery was well matched between the groups.

Table 42. Comparison of mode of delivery with other studies:

<i>Trials</i>	<i>Present study</i>	<i>Rhoades et al¹²⁹</i>	<i>Panburana et al⁷⁰</i>	<i>Purisch et al⁸²</i>	<i>Ruangkit et al¹⁰⁶</i>	<i>Celen S et al¹³⁰</i>
Comparison	DCC Vs UCM	With and without implementation of DCC	DCC Vs UCM	DCC Vs ICC	ECC vs DCC	DCC for 3 minutes Vs without DCC
Mode of delivery	Vaginal + caesarean	Vaginal+ caesarean	Vaginal+ caesarean	Caesarean delivery	Vaginal+ Caesarean delivery	Caesarean delivery
	Vaginal DCC-148 UCM –121 Caesarean DCC-115 UCM-151	Vaginal Pre protocol –232 Post protocol-221 P =0.25 Caesarean Pre protocol –93 Post protocol-103 operative vaginal Pre protocol –16 Post protocol-17	Vaginal UCM- 49 DCC –50 Caesarean UCM - 35 DCC-34	DCC- 57 ICC- 56	Vaginal: ECC-43 DCC-55 Caesarean section: ECC-253 DCC-99 P=<0.01	Pre cohort - 235 Post cohort – 264
P value	P=<0.001	P=0.67	P=0.87			

Comparing maternal blood loss with other studies:

Present study –

1. The mean blood loss among 535 participants in DCC was 312.59 ± 133.14 , and in UCM group was 311.36 ± 124.88 , which showed no significant difference in blood loss between the two groups ($p=0.913$).
2. In the sub-analysis involving 269 subjects who underwent vaginal deliveries, the mean blood loss in DCC was 243 ± 109 and UCM was 217 ± 90 and was not significant ($p=0.086$) between the two groups.
3. Likewise, there was no significant difference in the estimated maternal blood loss in caesarean delivery among 256 subjects, which was 402 ± 107 , and 387 ± 93 ($p=0.315$) in DCC and UCM groups, respectively.

In a similar study¹²⁹ --

1. Compared with and without the implementation of delayed cord clamping in 682 subjects showed the mean blood loss in the pre-cohort group was 400(300-600), and the post-cohort 400(300-600) was not statistically significant ($p=0.63$).
2. Similarly, the blood loss in the vaginal deliveries between the cohort groups was 300 (250–350) and was 300 (250–350) which was not significant ($p=0.43$).
3. When compared with caesarean deliveries ($n=196$), pre-protocol and post-protocol blood loss was 800 (600–900) and was 900 (700-1000) which showed **significant differences** between the two groups (**$p<0.001$**), with post protocol group showing increased blood loss.

4. This was a retrospective study and the blood loss in caesarean delivery was significantly high in DCC group which can be attributed to a 60-second delay in repair of the bleeding hysterotomy.
5. The estimation of blood loss was subjective in the study and did not use weighing of laparotomy sponges for a more objective quantification of blood loss.
6. In this study, estimating the postpartum blood counts after vaginal deliveries was not done, and thus the change in hemoglobin from ante- partum to postpartum was only available for patients delivered by caesarean deliveries.

In other similar studies^{70,82,106,130} comparing delayed cord clamping with immediate cord clamping did not show any significant effect on maternal blood loss.

Table 43. Comparing maternal blood loss with other studies:

<i>Trials</i>	<i>Present study</i>	<i>Ruangkit et al¹⁰⁶</i>	<i>Rhoades et al¹²⁹</i>	<i>Celen S et al¹³⁰</i>	<i>Panburana et al⁷⁰</i>	<i>Purisch et al⁸²</i>
Comparison	DCC Vs UCM	ECC Vs DCC	With and without implementation of DCC	DCC for 3 minutes Vs without DCC	ECC Vs DCC	DCC Vs ICC
Mode of delivery	Vaginal + caesarean delivery	Caesarean delivery	Vaginal and caesarean delivery	Term caesarean delivery	Vaginal and caesarean delivery	Caesarean delivery
Mean blood loss	Vaginal +Caesarean: DCC - 312.59 (100, 750) UCM - 311.36 (100, 700) P=0.913 Vaginal : DCC- 243 UCM- 217 P=0.086 Cesarean: DCC- 402 UCM- 387 P=0.315	ECC – 581.5 DCC – 503.3 P= 0.40	Preprotocol- 350 (250–600) Postprotocol- 300 (250-700) p=0.63 <u>Vaginal delivery</u> Preprotocol- 300 (250–350) Postprotocol- 300 (250–350) P=0.43 <u>Caesarean delivery – Preprotocol-</u> 800 (600–900) Postprotocol- 900(700-1000). P <0.01	Pre cohort - 400 (300-600) Post cohort – 400 (300-600) P=0.52	UCM - 300 (150–1200) DCC- 300 (100–1000) p=0.26	ICC – 800(800-1000) DCC – 800(800 - 800) P=0.13

Comparison of pre and post delivery hemoglobin with other studies:

The maternal blood loss was estimated among 535 subjects by comparing ***pre-and post-delivery hemoglobin and haematocrit values.***

1. The pre-delivery hemoglobin in DCC was 12.49 ± 1.12 , and UCM was 12.41 ± 1.06 ($p=0.396$).
2. The post-delivery mean hemoglobin in DCC was 10.73 ± 1.02 and UCM was 10.68 ± 0.95 ($p=0.564$).
3. The ***change in hemoglobin*** following pre and post delivery in DCC was 1.76 ± 0.1 , and UCM was 1.73 ± 0.11 , which showed *significance* ($p= <0.001^t$).
4. The present study implies that *maternal blood loss was comparatively higher in delayed cord clamping group than in the cord milking group due to significant drop in hemoglobin following delivery* . This can be attributed to a delay of 60 seconds in hysterotomy closure or episiotomy incision closure leading to increased maternal blood loss

The sub-analysis compared vaginal and caesarean deliveries individually.

1. In **vaginal deliveries** among 269 subjects, the change in hemoglobin pre and post-delivery was not statistically significant ($p=0.193^{MW}$) between the two groups.
2. In **caesarean** deliveries among 256 subjects, the change in Hemoglobin pre and post operatively was also insignificant ($p=0.839^{MW}$).

When the mode of delivery was analysed individually, the two groups did not have any impact on maternal blood loss and change in hemoglobin before and after delivery, which can be explained due to a comparatively smaller sample size of 269 and 256 subjects in vaginal and caesarean deliveries respectively.

In a study¹³⁰ done to compare the implementation of DCC for 3 minutes in term caesarean deliveries showed no significant difference in maternal blood loss.

1. The maternal hemoglobin before delivery in pre cohort group was 7.4 and post cohort group was 7.4.
2. The maternal hemoglobin after delivery in pre cohort was 6.4 and post cohort was 6.4.
3. The change in hemoglobin following delivery in pre cohort was 0.8 [-1.3 to -0.5] and post cohort was 0.9 [-1.4 to -0.6] which was significantly ($p=0.01$) higher in post cohort group.
4. In this study, it was thought that, the risk for maternal bleeding complications was estimated to be higher in cesarean section because of the lack of adequate uterine contractions and hence, this resulted in a relative skepticism for implementing delayed cord clamping during a cesarean section.
5. There was delayed administration of oxytocin to avoid any influence on the placental-to-neonatal transfusion

Other studies^{82,106,127,128,129} comparing the maternal blood loss by change in hemoglobin pre and post delivery did not result in any significant difference.

Table 44. Comparison of pre and post delivery hemoglobin with other studies:

<i>Trials</i>	<i>Present study</i>	<i>Ruangkit et al¹⁰⁶</i>	<i>Rhoades et al¹²⁹</i>	<i>Celen S et al¹³⁰</i>	<i>Purisch et al⁸²</i>	<i>De Paco et al¹²⁷</i>	<i>De Angelis et al¹²⁸</i>
Comparison	DCC Vs UCM	ECC Vs DCC	With and without implementation of DCC	DCC for 3 minutes Vs without DCC	DCC Vs ICC	ECC vs DCC	DCC vs ICC
Mean haemoglobin change	DCC- 1.76 ± 0.1 UCM - 1.73 ± 0.11 p = <0.001 DCC >UCM	ECC – 2.2 DCC – 1.9 P =0.63	<u>Caesarean delivery</u> Pre protocol - 1.67 Post protocol -1.87 P=0.21	Pre cohort -0.8 [-1.3 to -0.5] Post cohort -0.9 [-1.4 to - 0.6] p=0.01	ICC - 1.90 g/dL DCC-1.78 g/dL p=0.49	Post HB: ECC – 11.0g/dl DCC- 10.5 g/dl P=0.079	DCC- 1.1 ICC -1.2 p= Not significant

Comparison of third stage of labour with other studies:

1. The mean duration of third stage of labour in DCC was 3.03 ± 1.13 and UCM was 2.84 ± 1.14 which showed no significant difference in the duration between two groups ($p=0.07537$).
2. In the present study, the third stage duration was a subjective measurement between two groups.

Study done to compare the duration of third stage between early and delayed cord clamping did not show significant difference between groups($p=0.353$)

Table 45. Comparison of third stage of labour with other studies:

<i>Trials</i>	<i>Present study</i>	<i>De Paco et al¹²⁷</i>
Comparison	DCC Vs UCM	ECC vs DCC
Duration of third stage	DCC- 3.03 UCM-2.84 P=0.07537	ECC – 8.2 DCC – 9.0 P=0.353

Comparison of post partum hemorrhage with other studies:

Present study -

1. In vaginal deliveries, only 3 cases in DCC and 1 case in UCM were reported with blood loss of more than 500 ml($p=0.299$).
2. In cesarean deliveries, none of the recruited cases have reported with blood loss of > 1000 ml.
3. The additional administration of uterotonics showed significant association ($p=0.049$) with *increased administration in DCC*

A Study¹⁰⁶ done to compare ECC vs DCC showed

1. The higher number of cases with post partum hemorrhage observed in early cord clamping group can be explained by higher cesarean section rate in ECC group.
2. The study hypothesised that patients who underwent cesarean section, on average, tend to lose more blood than who undergo vaginal delivery.

Another study¹²⁹ done with and without implementation of DCC found

1. After stratification by mode of delivery, there was an increased risk of PPH in caesarean deliveries post protocol which can be attributable to a 60-second delay in repair of the bleeding hysterotomy.
2. These results were subjected to substantial selection bias as DCC was contraindicated in high risk cases with adverse maternal outcomes.

Table 46. Comparison of post partum hemorrhage with other studies:

3. Trials	Present study	Rhoades et al ¹²⁹	Ruangkit et al ¹⁰⁶	Celen S et al ¹³⁰
Comparison	DCC Vs UCM	With and without implementation of DCC	ECC Vs DCC	DCC for 3 minutes Vs without DCC
Post partum hemorrhage	Vaginal: DCC- 3 UCM-1 P=0.299 Cesarean : nil	Vaginal : Pre protocol- 6 Post protocol-2 P=0.17 Cesarean: Pre protocol-22 Post protocol-43 P=0.01	Vaginal ECC – 11 DCC – 11 P=0.51 Cesarean ECC-24 DCC -11 p-0.63	Pre cohort-26 Post cohort-35 OR-1.24 p- not significant
Nee for blood transfusion	DCC-7 UCM-3 P=0.183	Vaginal : Pre protocol- 2 Post protocol-3 P=0.62 Caesarean: Pre protocol-8 Post protocol-14 P=0.27	Vaginal ECC – 3 DCC –3 P=1.00 Caesarean ECC-20 DCC -6 p-0.56	Pre cohort- 9 Post cohort-13 OR-1.33 p-Not significant

Similarly, the results were analysed among **460 subjects** with equal distribution of subjects of 230 in each group were analysed.

1. The age wise distribution ($p=0.698$), obstetric history($p=0.221$), gestational age($p = 0.075$), BMI($p= 0.135$), gestation period($p=0.380$) was comparable between two groups.
2. On estimating the maternal blood loss among 460 participants, the mean blood loss in group A was 324.8 ± 134.0 , and in group B was 308.0 ± 120.0 , which showed no significant difference in blood loss between the two groups ($p= 0.157$).
3. The pre-delivery hemoglobin between two groups was not significant ($p=1.000$). Likewise, the post-delivery mean hemoglobin between two groups was insignificant ($p=1.000$). The change in hemoglobin following delivery between two groups was showed no significant difference in blood loss between two groups($p=1.000$). In the present study, we did not take into account the blood lost in soaked clothes, pads and gauzes used.
4. The pre-delivery haematocrit in group A was 37.0 ± 2.6 , and in group B was 37.0 ± 2.5 . The post-delivery haematocrit in group A was 32.2 ± 2.5 , and in group B was 32.3 ± 2.3 . The change in haematocrit following delivery showed no significant difference between two groups ($p= 1.000$).
5. The present study also compared the third stage of labour duration in vaginal and caesarean deliveries. The mean duration of third stage of labour in group A was 2.9 ± 1.2 and group B was 3.0 ± 1.1 which shows no significant difference in the duration between two groups ($p=0.352$). In the present study, the third stage duration was a subjective measurement between two groups.

Comparison of ferritin level in infant at 3rd month of life:

In present study-

1. Mean ferritin in DCC was 258 and UCM was 248 which was not significant (p=0.72)

Similar study¹³² –

1. compared the effect of umbilical cord milking and delayed cord clamping on serum ferritin at 6 weeks of life in term neonates.
2. Mean serum ferritin (134.0 ng/ml [89.8]) in umbilical cord milking group was comparable to mean serum ferritin (142.7 ng/ml [87.1]) in DCC group at 6 weeks of age(p=0.49).
3. Also in this study, the technique of cutting the cord and then milking was a drawback

Trials	Present study	Jaiswal et al,¹³²	Vashistha et al,¹³³
Comparison	DCC Vs UCM	DCC Vs UCM	DCC vs UCM
Serum ferritin levels at 3 rd month of life in infants	DCC- 258.07 UCM-248.44 P=0.72	DCC- 142 UCM-133 P=0.49	DCC- 131 UCM-133 P=0.006

When 535 subjects were analysed, there was a **significant drop in haemoglobin following delivery in delayed cord clamping group implying increased maternal blood loss in delayed cord clamping group** but the direct measurement of estimated maternal blood loss was not significant, as it did not include the blood lost in soaked clothes, pads and gauzes used during deliveries.

CONCLUSION

1. From the present study, it is observed that delayed cord clamping was associated with increased maternal blood loss compared to umbilical cord milking which is evidenced by a significant drop in haemoglobin from pre to post delivery.
2. Serum ferritin levels in infants at 3rd month of life did not differ between the two groups.
3. This study provides clear evidence that umbilical cord milking is *equally effective and time saving* with advantages of delayed cord clamping with reduced maternal blood loss.

Umbilical cord milking provides dual advantages: Maternal reduced blood loss and serum ferritin levels in infant at third month comparable to delayed cord clamping.

LIMITATIONS

Strengths:

1. It is a randomised controlled trial including a larger sample size with double blinding.
2. Using a power of 99% to estimate sample size makes the study significant.

Limitations:

1. In the present study, the estimated maternal blood loss included only the blood loss noted in BRASS V Drape in vaginal deliveries but in caesarean delivery blood loss was an estimate.
2. The duration of third stage of labour was a subjective measurement and further sub-study is necessitated.

SUMMARY

Third stage of labour begins with the delivery of the fetus to the complete expulsion of the placenta and membranes. One of the deadliest complications of third stage is post partum hemorrhage and is the leading cause of death across the globe. The timing of the umbilical cord clamping is controversial and debated over decades. Delayed cord clamping has got many advantages on neonates but there is limited evidence on maternal postpartum blood loss especially in deliveries with episiotomy, cervical lacerations and with delayed hysterotomy closure. The present study is done to evaluate the maternal blood loss after umbilical cord milking vs delayed cord clamping.

It is a randomised controlled trial conducted in KAHER'S Dr Prabhakar Kore Hospital over a period of 18 months. Pregnant women admitted in labour room with singleton live gestation of 34 0/7 weeks to 41 6/7 weeks with Hemoglobin > 9.9 mg/dl were screened and eligible women after consenting the study were enrolled. Randomized by SNOSE (Serially Numbered Opaque Sealed Envelopes) method into DCC and UCM.

In intact umbilical cord milking group, cord blood was milked for 5 - 8 times for a period of 15-20 seconds towards the neonate.

In delayed cord clamping group, cord was clamped 60 -180 seconds after the delivery of newborn. Maternal blood loss was estimated by comparing the pre and post-delivery hemoglobin by cyanmethemoglobin method.

During the study period, out of 4681 deliveries approached, 1235 participants were screened, and 600 participants were eligible and enrolled for the study. They

were randomized into two groups with intervention done in 535 participants and 65 participants were excluded from the study.

In the present study, the mean age ($p=0.847$), gravidity(0.069), gestational age(0.407) and BMI(0.145) were comparable between two groups. The period of gestation(0.045) and mode of delivery was significant between two groups(<0.001).

The estimated maternal blood loss among 535 participants was not significant between the two groups ($p= 0.913$). However the drop in hemoglobin following pre and post delivery was higher in DCC (1.76 ± 0.1) than in UCM (1.73 ± 0.11) which was *significant implying increased blood loss in delayed cord clamping group* ($p= <0.001$). The present study implies that blood loss was comparatively *higher in delayed cord clamping group* than in the cord milking group but the direct measurement of estimated maternal blood loss was not significant as it did not include the blood lost from soaked clothes, pads and gauzes used during the deliveries. The additional administration of uterotonics (medical management) was higher in DCC and was **significant** ($p=0.049$). Other outcomes like duration of third stage of labour ($p=0.07537$), postpartum haemorrhage, the need for blood transfusion was not significant between two groups. Likewise, the serum ferritin levels in neonates at 3rd month of life was insignificant($p=0.72$)

From the above study, umbilical cord milking can be considered as *equally effective* technique with advantages over delayed cord clamping with decreased maternal blood loss as it is *faster and time saving* and can be preferred in early neonatal resuscitation

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ANNEXURE - I –
INFORMED WRITTEN CONSENT FOR PARTICIPANTS

**“Delayed cord clamping vs intact Umbilical cord milking and its effects on
Maternal blood loss-A Randomized Control Trial.**

Principal investigator:

REG NO: BH0120007

POST GRADUATE,

Department of Obstetrics and Gynecology,
J.N. Medical College, KAHER, Belagavi.
Belagavi.

Guide:

Dr. _____

PROFESSOR,

Department of Obstetrics and Gynecology,
J.N. Medical college, KAHER,

Purpose of the Study:

Umbilical cord clamping and cutting is one of the most unique parts of birth processes it prevents excessive blood loss in the mother and allows the new-born to be taken away from mother to revive. However the timing for cord clamping and cutting is uncertain and with different timing approaches there are various benefits and risks.

These procedures help in increased transfer of blood from mothers to the neonates and increases the iron stores in the newborn in the first few months of life. The purpose of this study is to estimate the blood loss in the mother after delivery and the effects of the iron stores in the new-born .

Type of Study:

Once you agree to participate in the study you will be allocated in either of two groups, among them one group will have intact umbilical cord milking and the other will have delayed cord clamping. In the group of umbilical cord milking, the cord is milked for 5 times within 20 seconds at a rate of 10cm/second with 2 second interval in a 25 cm umbilical stump and then clamped 2-3 cm from the stump. In the

group of delayed cord clamping, the cord is clamped 60-180 seconds after delivery of newborn. In both groups, the data will be recorded by the doctors by following these steps from delivery to next 2-3 days / till discharge.

Once you are enrolled in the study, you will be in any one of the above groups. The half teaspoon blood sample from you will be collected at the time of enrolment into the study and half teaspoon (2 ml) of blood will be collected within 48-72 hours after delivery to measure the amount of blood levels in your body.

Voluntary Participation

Your participation in this research is voluntary. It is your choice whether to participate or not. Your decision whether to participate in the study or not will not change the present or future health care services offered to you and will not affect your relationship with Dr.Prabhakar Kore Charitable Hospital and Research Centre, J.N. Medical college, KAHER, Belagavi. If you choose not to participate in this study, you will still be offered good treatment at our hospital and you will continue to receive the routine pregnancy care at our hospital. If you decide to participate you are free to withdraw at any time.

Potential Risks of Discomfort:

There is a risk of increase in blood loss in the mother after delivery during these procedures. While drawing the blood from the arm it may cause some pain, blood collection at the site of blood drawing and fainting etc.

Benefits

The benefits of taking part in this study will help us to assess the blood loss in the mother by comparing the blood levels before and after the delivery (haemoglobin and packed cell volume). it will help us to assess which mother in two groups will have less blood loss .

Confidentiality

Your confidentiality will be respected. No information that discloses your identity will be released. All the information taken through interviews with you will be kept safely and no person other than authorized local key investigators will be able to trace the information to your name or your address.

Whom to contact with questions about the study

We have given you information about the study called “Delayed cord clamping vs intact Umbilical cord milking and its effects on maternal blood loss” – a randomized control trial. We have discussed the risks and benefits of the study and you understand that you do not have to agree to be in the study or may decide later not to be part of the study. This will not affect your or your baby’s care in any way.

If you have any questions, please call:

REG NO: BH0120007

Dr. _____

If you have questions about your rights as a study participant, please contact DR.HARSHA HEGDE, Chairperson, JNMC, IEC and Scientist D, ICMR, National Institute of Traditional Medicine, Belagavi-9480422500

I have read this consent form or it has been read to me in presence of a witness in my vernacular. I was given opportunity to ask questions and they were answered to my satisfaction. By signing this document I declare that I have consented to participate in this study.

Signature or Thumbprint of Person Providing Consent

Date

Signature or Thumbprint of Witness/parents

Date

Signature of Person Obtaining Consent

Date

Person requesting consent, please check applicable boxes:

- ☐ Consent obtained (for adult respondent)
- ☐ Assent (for minor respondents)
- ☐ Consent from authorized person of minor respondent

SCREENING FORM

Screening number: IP number: Date of screening(dd-mm-yyyy): First name : Middle name. : Last name : Husband's name: Age (years). : Address: H.no. - Street - Taluka- District- Phone number 1: Phone number 2:

Registered	
Unregistered	

Eligibility:

YES – 1 NO – 2

1. Singleton Live Gestation.

☐

2. Gestational age (34 to 41 6/7 weeks) of pregnancy

☐

3. Maternal Hb: >9.9mg/dl	☐
4. Multiple Gestation.	☐
5. Diabetes.	☐
6. Hypertensive mothers	☐
7. H/O Smoking.	☐
8. Known case of Bleeding disorders.	☐
9. Rh Sensitized Pregnancy.	☐
10. Congenital Anomalies of Fetus.	☐
11. Intrauterine Fetal Death.	☐
12. IUGR with increased resistance Or Fetal Distress (baby requiring resuscitation in opinion of paediatrician and obstetrician).	☐
13. Abnormal placentation.	☐
14. HIV Positive status	☐
15. HbsAg positive status	☐
16. Antepartum eclampsia	☐
17. Meconium stained liquor	☐
Is she eligible?	☐

If eligible, consent to be taken.

Consent:

- | | |
|--|--------------------------|
| a. Does the woman assent to participate? | ☐ |
| b. Has the study consent form been signed? | ☐ |

DATA COLLECTION INSTRUMENT

“Delayed cord clamping vs intact Umbilical cord milking and its effects on maternal blood loss – a Randomized Control Trial”.

Screening Id: Enrollment number: Batch :

YES – 1 NO – 2

Scans:

- a. Dating scan done
- b. Anomaly scan done
- Any anomalies noted
- c. Growth scan done

H/O Parenteral iron correction in the current pregnancy :

FCM : IRON SUCROSE : Correction done at : 2nd trimester : 3rd trimester : **Obstetric history:**Married Life (years) : Consanguinity : (YES - 1, NO - 2)

If yes,

Degree of consanguinity : Obstetric score : Gravida Para Live Abortion **Menstrual history:**Menarche (age in years):

YES – 1, NO – 2

Regular Past menstrual cycles:

Last menstrual period (dd-mm-yyyy):							
Expected date of delivery (dd-mm-yyyy):							
USG EDD (dd-mm-yyyy):							
Period of gestation (weeks/ days)							
If according to LMP :							
According to C.EDD :							

Past History : YES – 1 , NO – 2

a. Known case of Diabetes mellitus :	
If yes, Duration (in years) :	
Treatment received :	
b. Known case of Hypertension :	
If yes, Duration (in years) :	
Treatment received :	
c. H/O recurrent blood transfusions :	
If yes, Duration (in years) :	
d. Known case of Cardiac disorder :	
If yes, Duration (in years) :	
Treatment received :	
e. Known case of Hypothyroidism. :	
If yes, Duration (in years) :	
Treatment received :	
f. H/O any surgery in past :	
g. H/O any Drug allergy :	
If Yes, Name of the drug. :	

Personal History :

YES – 1 , NO – 2

Adequate diet	
a. Vegetarian	
b. Non- vegetarian	
c. Eggeterian	

Normal appetite	
Adequate sleep	
Normal Bowel & Bladder habits	

General physical examination- at admission

Height (in centimetres)		
Weight (in kilogram)		(YES – 1, NO – 2)
BMI		
Pallor		
Icterus		
Pedal Oedema		
Blood pressure (mmHg)		
Pulse rate (beats per minute)		

Systemic examination :

Per Abdomen: Uterine size (in weeks) :	
Presentation :	
Tone :	
Foetal Heart rate per minute	beats
EFW clinically :	
USG :	
Cardiovascular: _____	
Respiratory : _____	

Investigations-

Date (dd-mm-yyyy) :

Blood Group:

Haemoglobin (g/dl) :

(cyanmethemoglobin method)

Packed cell volume (%) :

HIV : (Non- reactive – 1,
Reactive – 2)

HbsAg : ☐ (No
☐

VDRL : (Negative – 1, Positive – 2)

PLATELET(lakhs) :

SR TSH(mu IU/ml) :

DIPSI :

URINE R &M :

Provisional diagnosis:

Enrollment done:

If enrolled, Randomization done.

☐

Was the woman randomized?

☐

If not randomized indicate reason:

1. Withdrawal from study

☐

2. Other

☐

Date of Randomization:

(dd-mm-yyyy)

Participant number:

(see sealed envelope)

Batch number. :

Investigator's name :

Signature:

k. Maternal blood loss :

vaginal delivery : Brass V Drape : ml

caesarean section: mops : x 30 ml :
ml

suction : ml

Total : ml

Maternal Outcomes:

1. ESTIMATED MATERNAL BLOOD LOSS IN:

a. Vaginal Delivery:(ml)

b. Caesarean Section: (ml)

BEFORE DELIVERY AFTER DELIVERY

2.HAEMOGLOBIN: (gm/dl)

(cyanmethemoglobin)

3.PACKED CELL VOLUME: (%)

4.DURATION OF THIRD STAGE:

NEONATAL PROFORMA:

BABY IP NUMBER.

:

MOTHER IP NUMBER:

SEX

:

BIRTH WEIGHT(kg)

:

DATE OF BIRTH:

(dd-mm-yyyy)

TIME OF BIRTH

:

GESTATIONAL AGE:

HISTORY OF FETAL DISTRESS:

 (yes-1 /no-2)

APGAR SCORE

(AT 1 AND 5 MINUTES):



adm-ctrl@nic.in via nic.in
to me ▾

Aug 31, 2021, 4:02 PM ☆ ↶ ⋮

Dear Concerned,

Trial REF/2021/02/040886 has been registered. The registration number for this trial is **CTRI/2021/08/036094**. Kindly note the same for your records. You are requested to update the trial every 6 months.

Regards

CTRI Team

Screening no		Enrolled and randomised	Allocated and intervention done	Allocated and intervention not done (with reasons added)	IP NUMBER	AGE(years)	SCORE	Gestational age AT DELIVERY(weeks and days)	Intervention group	H/O PARENTERAL IRON CORRECTION (1 - YES / 2 - NO)	2ND TRIMESTER CORRECTION (1 - YES / 2 - NO)	3RD TRIMESTER CORRECTION (1 - YES / 2 - NO)	PAST HQe - hypohidrosis / 2- no)	BMI(kg/m2)	mode of delivery	Intervention done in operation theatre (1 - yes/2- no)	Labor room (1- yes/2- no)	TERM(1 - yes/2- no)	PRETERM (1 - yes/2- no)	Normal vaginal delivery (1 - yes/2- no)	LSCS (1 - yes/2- no)	INDICATIONS FOR LSCS	BABY EXTRACTION easy / difficult (1 - yes/2- no)	Baby cried immediately after birth (1 - yes/2- no)	Baby birth time	DCC procedure time since birth	DCC Duration done (seconds)	UCM procedure time since birth	UCM Time period (seconds)	UCM done x times	Blood loss(ml)	Brown V drape (ml) for vaginal delivery	CS blood loss(ml)	Mops used x 30 ml = blood loss	Suction bottle (ml)	Pre op HB (mg/dl)	Pre op hematocrit	Post op HB (mg/dl)	Post op hematocrit	Blood loss (ml)	Duration of third stage of labour(minutes seconds)	POST PARTUM HEMORRHAGE (BLOOD LOSS > 500 ML IN NORMAL VAGINAL DELIVERY)	POST PARTUM HEMORRHAGE (BLOOD LOSS > 1000 ML IN CESAREAN DELIVERY)	MEDICAL MANAGEMENT- UTEROTONICS	HAYMAN'S STITCH(1- YES / 2- NO)	8 LYNCH(1- YES / 2- NO)	UTERINE ARTERY LIGATION (1- YES / 2- NO)	Need for blood transfusion(1- yes / 2- no)	Parenteral iron correction(1- yes / 2- no)		
1	1	1			1037551	26	G3P2L1	38.5	DCC (delayed cord clamping)	1	2	1	E	27.3	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60					300		300	150	150		12.5	34	9	32.5	300	2.45	2	2	2	2	2	1		
2	2	2			1037576	34	G2P1L1	38.2	UCM(umbilical cord milking)	1	2	1	2	24.8	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####		5:35:20 seconds	20	6	310		310	150	160		14	32	9	31	310	1.5	2	2	2	2	2	1			
3	3	3			1038757	26	G2P1L1	40.5	UCM(umbilical cord milking)	2	2	2	2	25	VAGINAL	2	1	1	2	1	2	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####		9:45:15 seconds	15	5	400	400		310	150	160		12.9	39	12.5	38	400	2.45	2	2	2	2	2	2		
4	4	4			1038140	24	PRIMIGRAVIDA	40.6	DCC	2	2	2	2	29	LSCS	1	2	1	2	2	1	FETAL DISTRESS	1	1	#####	#####	60					440	440	240	200		14	38	13.5	33	440	2.4	2	2	2	2	2	2			
6	5	5			1038314	28	G3P2L2	37.5	UCM	1	1	2	2	23.2	LSCS	1	2	1	2	2	1	PREVIOUS 2 LSCS	1	1	#####	#####		10:01:15 seconds	15	5	400	400	240	160		10.8	28	10.2	30	400	2.33	2	2	2	2	2	2				
8	6	6			1038426	28	G5P3L3A1	39.3	DCC	2	2	2	2	25.6	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60					200	200				15.8	35	12.9	36	200	3.2	2	2	2	2	2	2			
14	7	7			1038698	24	G2P1L1	41.1	UCM	1	2	1	2	26.4	VAGINAL	2	1	1	2	1	2		1	1	#####	#####		11:45:15 seconds	15	5	300	300						13	32.5	12.9	31.5	300	2.4	2	2	2	2	2	2		
11	8	8			1038693	37	PRIMIGRAVIDA	38.3	DCC	2	2	2	2	25.7	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60					300	300	150	150		14	38	13.5	33	300	2.4	2	2	2	2	2	2			
12	9	9			1038550	20	G2P1L1	38.4	UCM	2	2	2	2	26	LSCS	1	2	1	2	2	1	SUSPICIOUS TRACE	1	1	#####	#####		12:56:15 seconds	15	6	350	350	240	110		12.6	32	10.4	29.6	350	3.1	2	2	2	2	2	2				
16	10	10			1038607	29	G2P1L1	38.6	DCC	2	2	2	2	25.6	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60					300	300	150	150		10.8	33	9.1	33	300	2.44	2	2	2	2	2	2			
19	11	11			1038901	18	PRIMIGRAVIDA	37.4	UCM	2	2	2	2	29	VAGINAL	2	1	1	2	1	2		1	1	#####	#####		1:11:15 seconds	15	5	400	400						12.5	31	9.5	30	400	3.4	2	2	2	2	2	2		
23	12		1 (fetal distress)		1039188	20	G2P1L1	40.4	DCC	2	2	2	2	26	LSCS	1	2	1	2	2	1	FETAL DISTRESS WITH THICK MSL	1	2	3:45 vorm.	#####	60					450	450				10.8	32	10.6	31.5	450	4.01	2	2		1	2	2	2	2	2
25	13	12			1039269	25	G2P1L1	38.4	DCC	1	1	2	2	27	VAGINAL	2	1	1	2	1	2		1	1	#####	#####										11.6	30.2			340											
26	14		2 (did not cry)		1039315	25	G2A1	40	UCM	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	FETAL DISTRESS	1	2	#####	#####																									
28	15	13			1039450	25	G2P1L1	38.1	UCM	1	2	1	2	30.9	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####		12:46:15 seconds	15	5	360	360	240	120		12.9	36.6	9.3	29.636	360	1.05	2	2		2	2	2	2	2	2	
29	16		3 (thick msl)		1034518	22	G3P1L1A1	39	DCC	2	2	2	2	27	LSCS	1	2	1	2	2	1	MSL	1	2	2:22 vorm.	#####									11.8	33.2			200												
30	17	14			1039543	24	PRIMIGRAVIDA	40.3	DCC	1	2	1	2	27.2	LSCS	1	2	1	2	2	1	CPD	1	1	3:34 vorm.	3:35 vorm.	60					340	340	240	100		10.4	30	10	32	340	3.3	2	2	2	2	2	2			
31	18		4 (persistent fetal tachycardia)		1039476	18	G3P1A1	40.1	UCM	2	2	2	2	26	LSCS	1	2	1	2	2	1	PERSISTANT FETAL TACHYCARDIA	1	2	#####	#####										10.6	30.2			340											
33	19	15			1039742	30	G4P1L1A2	35.3	DCC	2	2	2	2	29.3	LSCS	1	2	2	1	2	1	MACROSOMIA	1	1	#####	#####	60					490	490	360	130		15.4	40.5	13.7	39.2	490	3.3	2	2		1	2	2	2	2	2
34	20	16			1039547	22	PRIMIGRAVIDA	39.4	DCC	1	1	1	2	31.1	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60					300	300				12.6	33.4	10.8	30.2	300	4	2	2	2	2	2	2	2		
35	21	17			1039760	28	G4P2L2A1	39.1	UCM	2	2	2	2	26.4	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	9:33 vorm.	#####		9:33:15 seconds	15	6	340	340	240	100		12.9	40.6	11.2	34.6	340	4.2	2	2		2	2	2	2	2	2	
36	22	18			1039772	29	G3P1L1A1	38.2	UCM	2	2	2	E	27.1	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	8:44 vorm.	#####		8:44:15 seconds	15	5	220	220	120	100		10.8	34.6	10	30	220	4	2	2		2	2	2	2	2	2	
41	23	19			1039791	26	G3P1L1A1	37.5	DCC	1	1	2	E	27.1	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60					340	340	240	100		13.7	39	10.8	36	340	2.15	2	2		2	2	2	2	2	2
42	24	20			1040134	27	G3P2L2	39.4	DCC	1	2	1	2	26.6	LSCS	1	2	1	2	2	1	PREVIOUS 2 LSCS	1	1	#####	#####	60					340	340	240	100		13.7	38	13	36.8	340	3.3	2	2		2	2	2	2	2	2
43	25	21			1040201	24	G4P2L2A1	39	DCC	2	2	2	2	28	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60					300	300	150	150		12	42	11.2	39	300	2.05	2	2		2	2	2	2	2	2
44	26	22			1039543	23	G3P2L2	36.4	DCC	1	2	1	2	27.2	LSCS	1	2	2	1	2	1	CPD	1	1	#####	#####	60					430	430	330	100		10.6	34	9.93	33	440	2.04	2	2		1	2	2	2	2	2
46	27	23			1039426	23	PRIMIGRAVIDA	37	UCM	2	2	2	E	30	LSCS	1	2	1	2	2	1	FETAL DISTRESS	1	1	#####	#####		11:02:15 seconds	15	6	300	300	150	150		11.6	41	11.2	34	300	3.15	2	2		2	2	2	2	2	2	
47	28	24			1040296	25	G3P1L1A1	38.1	UCM	2	2	2	2	26.4	VAGINAL	2	1	1	2	1	2		1	1	#####	#####		11:15:15 seconds	15	5	400	400	300	100		10.8	40	9.5	31	400	3	2	2		2	2	2	2	2	2	
48	29	25			1040293	34	G2P1L1	38.5	UCM	1	2	1	2	25.6	LSCS	1	2	1	2	2	1	SEVERE OLIGOHYDRAMNIOS	1	#####	#####		6:54:15 seconds	15	5	400	450	300	150		11.6	34	10	33	450	1.05	2	2		2	2	2	2	2	2		
52	30	26			1040646	20	PRIMIGRAVIDA	40.5	UCM	2	2	2	2	33	VAGINAL	2	1	1	2	1	2		1	1	#####	#####		11:12:15 seconds	15	5	200	200		13.2	38.6	11	34	203	3.45	2	2		2	2	2	2	2	2			
53	31	27			1040606	34	PRIMIGRAVIDA	37.4	DCC	1	2	1	E	27.2	LSCS	1	2	1	2	2	1	SEVERE OLIGOHYDRAMNIOS	1	1	#####	#####	60					450	450	300	150		12.4	36	11	34	450	2.15	2	2		1	2	2	2	2	2
54	32	28			1040665	30	PRIMIGRAVIDA	39.2	UCM	2	2	2	2	30.9	LSCS	1	2	1	2	2	1	CDMR	1	1	#####	#####		12:50:20 seconds	20	7	450	450	300	150		12.5	36.2	10.8	34	450	2.3	2	2		2	2	2	2	2	2	
57	33	29			1039768	22	G2A1	36.6	UCM	2	2	2	2	27.1	LSCS	1	2	2	1	2	1	CDMR	1	1	#####	#####		2:51:15 seconds	15	5	410	410	300	110		12.5	36	11.6	34.2	410	2.1	2	2		2	2	2	2	2	2	
58	34	30			1040903	21	PRIMIGRAVIDA	40.3	UCM	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	FETAL DISTRESS	1	1	6:17 vorm.	#####		6:17:15 seconds	15	5	400	400	300	100		15	36	12	32	400	2.05	2	2		2	2	2	2	2	2	
59	35	31			1038643	24	PRIMIGRAVIDA	39.3	DCC	1	2	1	2	33.1	LSCS	1	2	1	2	2	1		1	1	#####																										

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605	260	232		1068597	27	G2P1L1	38.2	UCM	2	2	2	2	26.6	LSCS	1	2	1	2	2	1	SUSPICIOUS TRACE	1	1	#####	#####	60				400		400	300	100	13	36.2	11.4	32.4	400	3.44	2		2	2	2	2	2	2	2	2	2	
606	261	233		1068598	28	G2P1L1A5	37.2	UCM	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	4:13 vorm.				4:13:15 seconds	15	5	300		300	150	150	13	39	11.4	32	300	0.98	2		2	2	2	2	2	2	2	2	2
607	262	234		1066092	20	PRIMIGRAVIDA	39.2	DCC	1	2	1	2	27.1	LSCS	1	2	1	2	2	1	PREVIOUS 2 LSCS CDMR	1	1	#####	9:51 vorm.	60		10:49:20 seconds	20	7	400		400	300	100	11.2	36.2	9.8	30	400	1.18	2		2	1	2	2	2	2	2	2	1
610	263	235		1069125	24	PRIMIGRAVIDA	41.1	DCC	2	2	2	2	30.6	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	4:01 vorm.	4:02 vorm.	60				400		400	300	100	10.4	32.1	9.2	30	400	2.09	2		2	2	2	2	2	2	2	1		
615	264	236		1066042	25	PRIMIGRAVIDA	40.4	DCC	2	2	2	2	27.1	VAGINAL	2	1	1	2	1	2		1	1	4:59 vorm.	4:60 am	60				100	100				12	36	10.2	34.2	100	5	2		2	2	2	2	2	2	2			
618	265	237		1069725	26	G2P1L1	38.6	UCM	1	1	2	2	27.1	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####				6:39:15 seconds	15	6	480		480	300	180	14	39.4	11	34.2	480	2.22	2		2	2	2	2	2	2	2	2	
620	266	238		6218051	26	PRIMIGRAVIDA	34.5	UCM	2	2	2	2	30.2	LSCS	1	2	2	1	2	1	FETAL DISTRESS	1	1	3:59 vorm.				3:59:15 seconds	15	5	400		400	300	100	13	39	11.4	32	400	3.56	2		2	2	2	2	2	2	2		
621	267	239		1069794	28	PRIMIGRAVIDA	40	DCC	2	2	2	2	27.1	VAGINAL	2	1	1	2	1	2		1	1	4:37 vorm.	4:38 vorm.	60				150	150				14	39.2	13.6	38	150	4.9	2		2	2	2	2	2	2	2			
622	268	240		1069662	23	G2P1L1	40.2	DCC	2	2	2	2	26.6	VAGINAL	2	1	1	2	1	2		1	1	2:29 vorm.	2:30 vorm.	60				100	100				10.8	32.4	9.4	30	100	4.3	2		2	2	2	2	2	2	2			
623	269	241		1069664	24	G2P1L1	40.2	UCM	2	2	2	2	27.1	VAGINAL	2	1	1	2	1	2		1	1	#####				1:30:20 seconds	20	7	100	100				13	39.4	11.4	32.4	100	5	2		2	2	2	2	2	2	2		
625	270	242		1069787	23	G3P2L2	39.1	DCC	2	2	2	E	27	VAGINAL	2	1	2	2	1	2		1	1	#####	#####	60				420	420				13.9	39.4	12	32	420	4	2		2	2	1	2	2	2	2	2	1	
626	271	243		1069883	27	G2P1L1	34.4	UCM	1	2	1	2	30.6	LSCS	1	2	2	1	2	1	SUSPICIOUS TRACE	1	1	#####	#####	60									11.4	36.8	10.6	32	400	2.55	2		2	2	2	2	2	2	2	2		
627	272	244		1043227	23	G2P1L1	38.6	UCM	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####				11:28:15 seconds	15	6	400		400	300	100	12.4	36.4	11.6	32.4	400	2.3	2		2	2	2	2	2	2	2	2	
628	273	245		1070043	24	G2A1	38	UCM	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####				9:42:15 seconds	15	5	400		400	300	100	10.6	32.4	8.6	30	400	3.15	2		2	1	2	2	1	2	2	2	
634	274	246		1070518	27	PRIMIGRAVIDA	36.6	DCC	2	2	2	2	30.2	LSCS	1	2	2	1	2	1	BREECH	1	1	#####	#####	60				450		450	300	150	14	36	12.6	35.4	450	3.3	2		2	1	2	2	2	2	2	2		
636	275	247		1070272	28	PRIMIGRAVIDA	38.2	DCC	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	PREVIOUS 2 LSCS	1	1	#####	#####	60						400		400	300	100	13	39.4	11	32	400	3.4	2		2	2	2	2	2	2	2	2
639	276	248		1071034	20	PRIMIGRAVIDA	37.5	DCC	1	2	1	2	27.1	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60				300	300				12	39	10.6	34	300	3.3	2		2	2	2	2	2	2	2	2		
641	277	249		1071045	22	G3P2L2	37.6	UCM	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####				11:59:20 seconds	20	7	400		400	300	100	12.6	36.2	10	32	400	4	2		2	2	2	2	2	2	2	2	
642	278	250		1071244	25	PRIMIGRAVIDA	40.4	UCM	2	2	2	2	26.6	VAGINAL	2	1	2	1	1	2		1	1	#####				3:45:15 seconds	15	6	200	200				14	39	12	36	200	3.14	2		2	2	2	2	2	2	2		
649	279	251		1071542	26	G3P2L2	38.6	DCC	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	FAILED INDUCTION	1	1	#####	01:60 pm	60						400		400	300	100	10.6	32.4	9.2	30	400	3.3	2		2	2	2	2	2	2	2	
652	280	252		1071553	26	G2P1L1	40.1	UCM	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	NPL	1	1	#####				6:07:20 seconds	20	6	400		400	300	100	12	36	104	32.4	400	2.09	2		2	2	2	2	2	2	2		
654	281	253		1071834	21	PRIMIGRAVIDA	37	UCM	1	2	1	2	27.1	VAGINAL	2	1	1	2	1	2		1	1	#####	3:14 vorm.			3:14:15 seconds	15	5	200	200				10.8	32.1	9.6	30	200	5	2		2	2	2	2	2	2	2		
668	282		29 (Thin MSL with weak cry)	1072058	24	PRIMIGRAVIDA	40.6	DCC	2	2	2	2	27.1	LSCS	1	2	1	2	2	1	MSL	1	2	#####								440		440	300	140	13	39.6														
674	283	254		1072278	22	G3P1LOA1	37.3	UCM	2	2	2	2	30.4	VAGINAL	2	1	1	2	1	2		1	1	#####				10:49:20 seconds	20	6	100	100				13.2	34.2	10.6	32.4	100	5	2		2	2	2	2	2	2	2		
675	284	255		1071726	24	PRIMIGRAVIDA	37.8	DCC	1	2	1	2	26.6	LSCS	1	2	1	2	2	1	PREVIOUS 2 LSCS	1	1	#####	#####	60						400		400	300	100	12.6	39	11.4	32.6	400	2.43	2		2	2	2	2	2	2	2	
678	285	256		1072240	27	PRIMIGRAVIDA	37.4	DCC	2	2	2	2	26.5	LSCS	1	2	1	2	2	1	FAILED INDUCTION	1	1	#####	#####	60						400		400	300	100	13.5	39.4	11	32	400	3.45	2		2	2	2	2	2	2	2	
679	286	257		1072392	31	PRIMIGRAVIDA	37.6	UCM	2	2	2	2	26.5	LSCS	1	2	1	2	2	1	pPREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####				12:33:15 Seconds	15	5	400		400	300	100	14.6	39.2	12	36.4	400	3.46	2		2	2	2	2	2	2	2	2	
680	287	258		1072399	26	G3P2L1A1	37.4	DCC	2	2	2	2	30.2	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	1:24 vorm.				1:24:20 seconds	20	7	250		250	150	100	13.2	36.4	11.4	32	250	4	2		2	2	2	2	2	2	2		
681	288	259		1072242	23	G2P1L1	38.5	DCC	2	2	2	2	26.5	LSCS	1	2	1	2	2	1	SEVERE OLIGOHYDRAMNIOS	1	1	2:49 vorm.	2:50 vorm.	60				420		420	300	120	10.6	32.4	9	30	420	4	2		2	2	2	2	2	2	2			
682	289	260		1072386	24	G2P1L1	37.4	UCM	2	2	2	2	26.6	LSCS	1	2	1	2	2	1	NPL	1	1	#####				4:04:15 seconds	15	5	400		400	300	100	13	39.4	11.4	32	400	2.45	2		2	2	2	2	2	2	2		
683	290	261		1072506	27	G2P1L1	39.4	UCM	2	2	2	2	26.6	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####				10:42:15 seconds	15	5	500		500	300	200	13	38.4	9.9	32	500	3.45	2		2	1	2	2	2	2	2	1	
684	291	262		1076608	22	G2P1L1	39.5	DCC	1	2	1	2	26.5	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60				450	450				13	39.2	10.4	32	450	5	2		2	1	2	2	2	2	2	1		
685	292	263		1072475	23	PRIMIGRAVIDA	40	UCM	2	2	2	E	26.6	VAGINAL	2	1	1	2	1	2		1	1	#####				10:58:20 seconds	20	7	300	300				12	36.4	10	32	300	4.3	2		2	2	2	2	2	2	2		
688	293	264		1071934	23	G2P1L1	38.3	DCC	2	2	2	2	30.2	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60				400	400				12.6	38.4	10	31	400	4.3	2		2	1	2	2	2	2	2	1		
697	294	265		1073049	31	PRIMIGRAVIDA	39.2	DCC	1	2	1	2	25.7	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####							500		500	300	200	12	36.4	9.2	31	500	4	2		2	1	2	2	2	2	2	1	
698	295	266		1072801	28	PRIMIGRAVIDA	39.1	UCM	2	2	2	2	26.5	VAGINAL	2																																					

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976	438	393		110110	25	G3P1L2	37+5	UCM		1	2	1	2	27.5	LSCS	1	2	1	2	2	1	PREVIOUS 2 LSCS	1	1	#####			1:27:17 SECONDS	17	6	400		400	300	100		12.9	38.4	10.2	32	400	1.28		2		2	2	2	2	2	2	2	2
970	436	391		110096	23	PRIMIGRAVIDA	37+6	DCC		1	2	1	2	31.6	VAGINAL	2	1	2	2	1	2		1	1	2:25 vorm.	2:26 vorm.	60										12.8	38.4	10.2	32	100	2.22		2		2	2	2	2	2	2	2	2
971	437	392		110214	28	G2P1L1	39+2	UCM		1	1	2	2	27.3	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####			2:14:20 SECONDS	20	7	360		360	300	60		11.6	38.6	9.8	30	360	2.05		2		2	1	2	2	2	2	2	1
976	438	393		1123897	21	PRIMIGRAVIDA	40	DCC		2	2	2	2	27.4	VAGINAL	2	1	1	2	1	2		1	1	9:22 vorm.	9:23 vorm.	60										10.5	37.2	9.8	32.8	250	1.49		2		2	2	2	2	2	2	2	
977	439	394		1124060	20	PRIMIGRAVIDA	41 +1	UCM		2	2	2	2	26.2	VAGINAL	2	1	1	2	1	2		1	1	#####			12:41:17 SECONDS	17	7	200	200					12.6	39.6	11.4	34.2	200	2.03		2		2	2	2	2	2	2	2	
978	440	395		1124090	24	PRIMIGRAVIDA	40	DCC		2	2	2	2	25.5	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60										11.9	39	10.4	34	150	1.54		2		2	2	2	2	2	2	2	
982	441	396		1124192	26	PRIMIGRAVIDA	38+6	DCC		2	2	2	2	23.5	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60										13.9	36.7	11.6	35.4	250	1.34		2		2	2	2	2	2	2	2	
985	442	397		1124288	21	PRIMIGRAVIDA	37+3	UCM		2	2	2	2	27.4	VAGINAL	2	1	1	2	1	2		1	1	4:36 vorm.			4:36 :20 SECONDS	20	8	500	500					13.1	39	10.1	32	500	2.56		1		2	1	2	2	2	2	1	
986	443	398		1123500	20	PRIMIGRAVIDA	39+2	UCM		2	2	2	2	25.2	VAGINAL	2	1	1	2	1	2		1	1	#####			1:54:18 SECONDS	18	6	250	250					10.5	37.2	9	30	250	2.02		2		2	2	2	2	2	2	1	
990	444	399		1124300	28	G2AI	37+6	DCC		2	2	2	2	23.6	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60										14.8	39.6	12.2	37.1	250	2.34		2		2	2	2	2	2	2	2	
991	445		46(THICK MSL WITH FETAL DISTRESS)	1122879	24	PRIMIGRAVIDA	38+2	UCM		2	2	2	2	24.7	LSCS	1	2	1	2	2	1	FETAL DISTRESS WITH THICK MSL	1	1																													
992	446	400		1124038	34	G4P1LIA2	40 + 4	DCC		2	2	2	2	30	VAGINAL	2	1	1	2	1	2		1	1	1:20 vorm.	1:21 vorm.	60										12.8	37.9	11.9	35.3	200	1.46		2		2	2	2	2	2	2	2	
994	447	401		124431	21	PRIMIGRAVIDA	39+4	UCM		2	2	2	2	25.5	VAGINAL	2	1	1	2	1	2		1	1	#####			6:21:18 SECONDS	18	7	300	300					12.3	38.9	11.5	36.2	300	2.55		2		2	2	2	2	2	2	2	
1000	449	402	47 (thin MSL)	1124988	22	PRIMIGRAVIDA	38+4	DCC		2	2	2	2	26.5	LSCS	1	2	1	2	2	1	MSL	1	1	#####																												
1009	449	402		1124988	22	PRIMIGRAVIDA	38+4	DCC		2	2	2	2	26.4	VAGINAL	2	1	1	2	1	2		1	1	3:35 vorm.	3:36 vorm.	60										10.2	36.2	9.8	30	350	3.43		2		2	2	2	2	2	2	1	
1003	450	403		1125198	24	G3P2L2	40+1	DCC		2	2	2	2	26.7	VAGINAL	2	1	1	2	1	2		1	1	1:23 vorm.			1:23 : 20 SECONDS	20	7	250	250					11.9	38	11	34	250	2.49		2		2	2	2	2	2	2	2	
1004	451		48 (thin MSL)	1125434	27	PRIMIGRAVIDA	39+2	DCC		2	2	2	E	29.7	LSCS	1	2	1	2	2	1	MSL	1	1	#####																												
1005	452	404		1125397	24	G2AI	40+2	UCM		2	2	2	E	27.6	LSCS	1	2	1	2	2	1	NPL	1	1	5:54 vorm.			5:54:17 SECONDS	17	6	550		550	450	100		10.2	35.2	9	30	550	2.02		2		2	1	2	2	2	2	2	1
1007	453	405		1125793	22	G2AI	38+2	DCC		2	2	2	2	25.7	VAGINAL	2	1	1	2	1	2		1	1	1:30 vorm.	1:31 vorm.	60										12.6	38.4	11.4	34	300	3.12		2		2	2	2	2	2	2		
1009	454	406		1126218	23	PRIMIGRAVIDA	38	UCM		2	2	2	2	26.5	VAGINAL	2	1	1	2	1	2		1	1	2:39 vorm.			2:39 :18 SECONDS	18	7	200	200					11.9	38.4	10.4	32	200	1.59		2		2	2	2	2	2	2	2	
1010	455	407		1126458	24	G2AI	39+2	DCC		2	2	2	2	24.7	VAGINAL	2	1	1	2	1	2		1	1	2:30 vorm.	2:31 vorm.	60										13.5	40	12.1	38	300	2.02		2		2	2	2	2	2	2	2	
1018	456	408		1126681	30	G3P2L2	40+1	UCM		2	2	2	2	30	VAGINAL	2	1	1	2	1	2		1	1	#####			12:18:20 SECONDS	20	8	250	250					11.4	38.2	10.1	32	250	1.4		2		2	2	2	2	2	2	2	
1019	457	409		1130451	21	G2P1L1	38+3	DCC		1	2	1	2	27	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	6:51 vorm.	6:52 vorm.	60										12.6	39.1	10.9	36.4	410	2.04		2		2	2	2	2	2	2	2	
1020	458		49(thin MSL)	1136432	24	PRIMIGRAVIDA	38+6	UCM		2	2	2	2	25.7	LSCS	1	2	1	2	2	1	MSL	1	1																													
1021	459	410		1130532	22	G2P1L1	36+1	UCM		2	2	2	2	25.7	VAGINAL	2	1	2	1	1	2		1	1	#####			11:46 : 15 SECONDS	15	6	250	250					11.6	37.2	9.9	30	250	3.59		2		2	2	2	2	2	2	1	
1024	460	411		1130172	27	PRIMIGRAVIDA	36	UCM		1	1	2	2	26.2	VAGINAL	2	1	2	1	1	2		1	1	#####			4:28:20 SECONDS	20	7	250						11.2	36.2	10.4	34	250	3.45		2		2	2	2	2	2	2	2	
1026	461	412		1130483	34	G2P1L1	39	DCC		2	2	2	2	27.5	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60										10.9	37.1	9	30	580	1.03		2		1	2	2	2	1	2	1	
1027	462	413		1129962	22	G2P1L1	39+2	DCC		2	2	2	2	26.7	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60																										
1030	463	414		1130794	27	G2P1L1	38+5	UCM		2	2	2	2	27.9	VAGINAL	2	1	1	2	1	2		1	1	9:26 vorm.			9:26:18 SECONDS	18	6	200	200					13.4	39.2	11.4	36	200	4.16		2		2	2	2	2	2	2	2	
1032	464	415		1130811	28	G3P2L2	40+4	UCM		2	2	2	2	29.8	VAGINAL	2	1	1	2	1	2		1	1	#####			3:30:20 SECONDS	20	7	250	250					13.2	39	12.6	34	250	4.31		2		2	2	2	2	2	2	2	
1036	465	416		1130853	22	G3P1LIA1	36+3	UCM		1	1	2	2	27.2	VAGINAL	2	1	2	1	1	2		1	1	#####			1:02:20 SECONDS	20	7	250	250					13.4	39	11.2	34	250	3.55		2		2	2	2	2	2	2	2	
1037	466	417		1130915	25	G4P2LIA1	38+5	DCC		2	2	2	2	24.8	LSCS	1	2	1	2	2	1	PREVIOUS 2 LSCS	1	1	#####	#####	60										13.1	36.4	11.4	34.2	400	2.08		2		2	2	2	2	2	2	2	
1040	467	418		1131002	24	G2AI	39+4	UCM		1	2	1	2	29.2	VAGINAL	2	1	1	2	1	2		1	1	3:24 vorm.			3:24 : 18 SECONDS	18	6	400	400					12.8	39.1	11.4	34	400	4.08		2		2	2	2	2	2	2	2	
1041	468	419		1130973	30	G3P2L2	39+5	DCC		2	2	2	2	27.8	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60										12.6	36.2	10.4	30.2	400	1.34		2		2	2	2	2	2	2	2	
1042	469	420		1130816	22	PRIMIGRAVIDA	39+6	DCC		1	1	2	E	30	LSCS	1	2	1	2	2	1	CDMR	1	1	7:59 vorm.	7:10 vorm.	60										12.8	41.1	10.8	34	400	1.08		2		2	2	2	2	2	2		
1044	470	421		1130792	23	G3P1AI	40+1	UCM		2	2	2	2	27.9	VAGINAL	2	1	1	2	1	2		1	1	9:50 vorm.			9:50:15 SECONDS	15	6	150	150					11.6	39	9.2	30	150	3.45		2		2	2	2	2	2	1		
1047	471	422		1130892	24	PRIMIGRAVIDA	40+6	DCC																																													

1130	526	469		1136023	25	G3P1L1A1	38+3	DCC	2	2	2	2	27.9	VAGINAL	2	1	1	2	1	2	PREVIOUS LSCS WITH PROM	1	1	2:47 vorm.	2:48 vorm.	60				200	200					13.2	39	11.4	31.2	200	3.02	2		2	2	2	2	2	2	2			
1131	526	469		1135938	22	G2P1L1	39+6	DCC	2	2	2	2	32.1	LSCS	1	2	1	2	2	1		1	1	#####	13:15	60				350		350	300	50		11.2	39.2	10.2	30	300	0.58	2		2	2	2	2	2	2	2	2		
1131	527	470		1136044	19	PRIMIGRAVIDA	38+5	UCM	2	2	2	2	30	VAGINAL	2	1	1	2	1	2		1	1	#####			4:25:20 SECONDS	20	7	250	250					124	39.4	11.2	32	250	1.59	2		2	2	2	2	2	2	2	2		
1132	528	471		1135435	22	PRIMIGRAVIDA	40+2	DCC	2	2	2	2	29.5	LSCS	1	2	1	2	2	1	CDMR	1	1	#####	#####	60				500		500	400	100		12.4	39.4	11.2	32.1	500	0.5	2		2	2	2	2	2	2	2	2		
1133	529	472		1136036	25	G2P1L1	38+4	UCM	2	2	2	2	30.5	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####			4:30:18 SECONDS	18	6	350		350	300	50		10.8	30	9.5	27.8	350	1.04	2		2	2	2	2	2	2	2	1		
1134	530	473		1135939	30	G2P1L1	39+3	DCC	2	2	2	2	29.5	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60				300		300	200	100		11.4	39.4	10.3	30	300	0.48	2		2	2	2	2	2	2	2	2		
1136	531	474		1136220	25	G2P1L1	38+3	DCC	2	2	2	2	30	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60				300		300	200	100		12.1	39.2	10.3	30.2	300	1.08	2		2	2	2	2	2	2	2	2		
1138	532	475		1135724	27	G3P1L1A1	37+6	UCM	2	2	2	2	29.4	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####			4:19:17 SECONDS	4:19:17 SECONDS	17		350		350	300	50		11.7	39.2	10.4	29.4	350	1.03	2		2	2	2	2	2	2	2	2	
1139	533		58 (thin MSL)	1136268	28	PRIMIGRAVIDA	40	UCM	2	2	2	2	30	LSCS	1	2	1	2	2	1	MSL																																
1140	534		59 (thin MSL)	1136231	27	PRIMIGRAVIDA	39+4	UCM	2	2	2	2	29.4	LSCS	1	2	1	2	2	1	NON REASSURING NST																																
1141	535	476		1127698	25	G2P1L0	39	DCC	2	2	2	2	28.3	VAGINAL	2	1	1	2	1	2		1	1	2:54 vorm.	2:55 vorm.	60				200	200					11.5	39.2	10.2	30	200	3.44	2		2	2	2	2	2	2	2	2		
1143	536	477		1135683	22	G2P1L1	38+1	DCC	2	2	2	2	30	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60				400		400	300	100		12.5	39.2	11.2	30	400	1.12	2		2	2	2	2	2	2	2	2	2	
1144	537	478		1136439	31	G2P1L1	37+3	UCM	2	2	2	2	30	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####			10:35:16 SECONDS	16	6	320		320	250	70		12.6	39.2	11.2	32	320	1.01	2		2	2	2	2	2	2	2	2	2	2
1145	538	479		1136617	23	G3P1L1A1	39+4	UCM	2	2	2	2	28.4	VAGINAL	2	1	1	2	1	2		1	1	#####			11:26:20 SECONDS	20	7	340	340					13.2	40	11.2	34	340	1.22	2		2	2	2	2	2	2	2	2	2	
1146	539	480		1136329	22	PRIMIGRAVIDA	40	UCM	2	2	2	2	29.9	LSCS	1	2	1	2	2	1	NPL	1	1	#####			9:50:15 SECONDS	15	5	440		440	300	140		11.9	38.4	10.6	34	440	1.02	2		2	2	2	2	2	2	2	2	2	
1147	540		60 (thin MSL)	1136555	23	PRIMIGRAVIDA	38+6	DCC	2	2	2	2	28.5	LSCS	1	2	1	2	2	1	MSL																																
1148	541	481		1136553	28	PRIMIGRAVIDA	38+1	DCC	2	2	2	2	29.4	VAGINAL	2	1	1	2	1	2		1	1	6:05 vorm.	6:06 vorm.	60				350	350					12.5	39.5	11.3	36.3	350	3.22	2		2	2	2	2	2	2	2	2		
1149	542	482		1136705	26	G2P1L1	39+2	UCM	2	2	2	2	29.9	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####			11:06:15 SECONDS	15	7	300		300	200	100		10.6	34	9	29	300	1.22	2		2	2	2	2	2	2	2	2	2	2
1151	543		61(FETAL DISTRESS)	1136778	27	PRIMIGRAVIDA	38+4	UCM	2	2	2	2	28.6	LSCS	1	2	1	2	2	1	FETAL DISTRESS																																
1152	544	483		1136785	22	G3P2L2	39+3	DCC	2	2	2	2	29.5	LSCS	1	2	1	2	2	1	BREECH	1	1	5:36 vorm.	5:37 vorm.	60				400		400	300	100		12.8	39.2	11.2	32	400	1.23	2		2	2	2	2	2	2	2	2	2	
1153	545	484		1136811	25	G2P1L1	38+2	UCM	2	2	2	2	29	VAGINAL	2	1	1	2	1	2		1	1	#####			1:18:18 SECONDS	18	6	150	150					10.8	32	9.2	27	150	3.44	2		2	2	2	2	2	2	2	2	1	
1154	546	485		1135585	19	PRIMIGRAVIDA	37+1	UCM	2	2	2	2	27.6	VAGINAL	2	1	1	2	1	2		1	1	#####			12:20:15 SECONDS	15	5	300	300					11.7	38.4	10.4	32	300	4.02	2		2	2	2	2	2	2	2	2	2	
1155	547	486		1137267	24	G2P1L1	39+6	DCC	2	2	2	2	30	LSCS	1	2	1	2	2	1	CPD	1	1	#####	#####	60				300		300	200	100		11.6	39.2	10.3	30	300	1.08	2		2	2	2	2	2	2	2	2	2	
1156	548	487		1137439	20	PRIMIGRAVIDA	38+4	DCC	2	2	2	2	30.4	LSCS	1	2	1	2	2	1	BREECH	1	1	#####	#####	60				520		520	250	70		12	38	11.2	30	320	1.55	2		2	2	2	2	2	2	2	2	2	
1157	549	488		1137487	22	G2A1	35+6	UCM	2	2	2	2	26.8	VAGINAL	2	1	2	1	1	2		1	1	7:05 vorm.			7:05:15 SECONDS	15	6	250	250					10.9	30.2	9.6	27.8	250	2.56	2		2	2	2	2	2	2	2	2	2	
1158	550	489		1136505	24	G2P1L1	39+2	DCC	2	2	2	2	30.5	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60				350		350	300	50		11.2	38.6	10.5	32	350	1.33	2		2	2	2	2	2	2	2	2	2	
1159	551	490		1137213	22	G2P1L1	39+1	UCM	2	2	2	2	29.2	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	9:43 vorm.			9:43:20 SECONDS	20	6	350		350	300	50		12.2	38.5	11.2	34	350	1.23	2		2	2	2	2	2	2	2	2	2	
1160	552	491		1137655	23	PRIMIGRAVIDA	40+3	UCM	2	2	2	2	27.5	LSCS	1	2	1	2	2	1	BREECH	1	1	#####			12:00:15 SECONDS	15	5	550		550	450	100		13.5	41.2	11.5	39	550	1.01	2		2	2	2	2	2	2	2	2	2	
1161	553	492		1137559	19	PRIMIGRAVIDA	40+4	DCC	2	2	2	2	28.4	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60				150	150					12.1	38	10.1	34	150	3.4	2		2	2	2	2	2	2	2	2		
1162	554	493		1137779	26	G3P1L1	38+5	UCM	2	2	2	2	30.5	VAGINAL	2	1	1	2	1	2		1	1	#####			10:35:15 SECONDS	15	6	100	100					10.4	32	10	30	100	3.56	2		2	2	2	2	2	2	2	2	2	
1164	555	494		1137850	25	PRIMIGRAVIDA	36+1	UCM	2	2	2	2	28.9	VAGINAL	2	1	2	1	1	2		1	1	#####			2:40:15 SECONDS	15	6	100	100					13.2	39	11.2	37.5	100	4.56	2		2	2	2	2	2	2	2	2	2	
1165	556	495		1138090	24	G2P1L0	40+5	DCC	2	2	2	2	29.4	VAGINAL	2	1	1	2	1	2		1	1	8:24 vorm.	8:25 vorm.	60				300	300					11.5	39	10.2	35.6	300	2.55	2		2	2	2	2	2	2	2	2		
1166	557	496		1139908	22	G2P1L1	39+2	DCC	2	2	2	2	30.4	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	#####	#####	60				250		250	200	50		13	37.5	11.2	34	250	2.03	2		2	2	2	2	2	2	2	2	2	
1167	558	497		1137952	25	G2P1L1	38+6	UCM	2	2	2	2	26.7	LSCS	1	2	1	2	2	1	PREVIOUS LSCS NOT WILLING FOR VBAC	1	1	9:56 vorm.			9:56:20 SECONDS	20	7	260		260	200	60		12.5	39.2	11.2	35.2	260	1.22	2		2	2	2	2	2	2	2	2	2	
1168	559	498		1138511	23	G2P1L1	38	DCC	2	2	2	2	29.4	VAGINAL	2	1	1	2	1	2		1	1	#####	#####	60				250	250					11.3	39.2	11	32	250	3.34	2		2	2	2	2	2	2	2	2	2	
1169	560	499		1138500	25	G4P1L1A2	38+4																																														